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A case study to investigate the use of computers across a school population

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A CASE STUDY TO INVESTIGATE THE USE OF COMPUTERS
ACROSS A SCHOOL POPULATION.

BY

J. Bersan B.Ed., Dip. Tch.

A Thesis Submitted in Partial Fulfilment of the
Requirements for the Award of

Bachelor of Education Honours

at the School of Education, Edith Cowan University

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ABSTRACT

The National Advisory Committee on Computers in Schools (Commonwealth Schools Commission, 1983) recommended to support computing in both government and non-government schools in Australia over 1984 - 1986. This led to the injection of computer resources to schools. The Western Australian Government then provided significant funds for the provision of computer equipment to primary and secondary schools (1987 -1989). Primary schools in Western Australia now have on average three computers per primary school. The Ministry of Education has produced a policy document on computer use in primary education which clearly outlines goals to be achieved by all primary school teachers and students.

This study investigated computer use across a whole school population and the achievement of computer education policy document goals. The results of this investigation indicated that teacher classroom practices were in the lower phases of goal achievement of the ministerial document. A significant number of factors were found to influence the teachers' progression along the policy goal continuum: The teachers' computer education training, administrative support, clear school policy direction, environmental constraints, the issue of available software, and the availability of time to practice and reinforce knowledge gained in inservices.

DECLARATION

"I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any institution of higher education; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text."

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CHAPTER ONE

Introduction

Significance of Study

Computer technology is becoming part of all facets of life. People in some way come in contact with computers in their daily lives. Downes (1986), suggests that teachers are being requested by a number of social agencies to implement the use of microcomputers in primary schools. The Western Australian Ministry of Education has supported computer usage as an aid to the normal learning process in education. Policy documents in 1980 and 1981, outlined computer activities relevant to primary and secondary education. Recently, funds have been provided from the Western Australian State Government for the provision of computer equipment to all primary and secondary schools.

Most schools now have equipment and access to resources for computer usage. The Western Australian Ministry of Education has outlined broad goals in computer usage to be implemented by every school in the state from K - 12. It was hoped that full achievement would be completed by 1990. The "Computer Use in Primary Education Policy" outlines goals and outcome indicators for all primary school teachers and students (Western Australian Ministry of Education, 1989.)

It was hoped that schools would look towards attaining the goals of the policy and the beginning phases would be fully implemented by 1990.

Funding by the Commonwealth and State Departments of Education in Australia, in the area of computer education, has led to research into computer applications in government schools. Limited research has been completed into the effectiveness of computers in Australian or Western Australian schools. A review of this literature indicates a general consensus on the need for further research into the current state of computer use in the classroom.

In a recent study by Fitzgerald, Hattie and Hughes (1986), one thousand schools were surveyed by questionnaire to determine the uses of computers in Australian schools. This study produced an expansive view of computer education in Australia, although an in-depth knowledge of each school was not gained. The respondents also recorded their perceived problems of computer education, not necessarily the problems being encountered in their own computer education programme.

Purpose of the Study

The purpose of this study was to:

1. Investigate the use of computers across a school population, and to explore prevalent patterns.

Specifically it intended to examine the degree to which goals, as outlined in The Policy Document, have been met by primary school teachers in a school setting.

2. Examine what factors influence the attainment of the goals outlined in the 'Computer Use in Primary Education Policy'.

It was intended that the outcome of this study should contribute to the school practices and display how successfully the school under study has implemented The Policy Document. Factors which have contributed to the goal achievements have been highlighted so that the school can undertake recommendations to help teachers progress along the continuum of indicators outlined in The Policy Document.

Description of the Study

This chapter provides an introduction to the study by introducing the area of investigation. Chapter two presents a review of the literature related to computer applications in schools and factors which may influence the computer education programme, culminating in the research questions guiding the study. In the third chapter a detailed account of the rationale and research methodology employed is presented. The fourth chapter is composed of teacher

profiles displaying the results of goal attainment and factors influencing each individual teachers computer education programme. This chapter also includes a profile of the school's computer policy. In Chapter five the overall findings of the study and the whole school profile of achievement of The Policy Document goals are discussed. Patterns and factors contributing to the attainment of the specific goals are outlined. The findings and their implications are discussed.

Chapter six highlights the factors which may have influenced the results of the study. The final chapter provides an appraisal of the study, outlining the limitations in interpretation and suggests a list of recommendations. The latter section of the chapter provides a conclusion to the study.

CHAPTER TWO

Review of Literature

Computers were introduced into Western Australian schools in the late 1970's and the developments of microcomputer technologies has been changing rapidly. Education has the potential to use the new technology of computers as a tool for teaching and learning. Research and literature pertaining to computer education is readily available. This literature review focuses on patterns of computer use in education throughout the world and specifically the situation in Australia and Western Australia. Particular reference is made to factors which influence the use of computers in the schooling system and the most prevalent computer applications. If we are to implement The Policy Document we need to make certain that as few limitations as possible exist.

Factors Which Limit The Use of Computers

The advent of computers into schools means educational change. This innovation and change is a complex process which has met with some resistance in the schooling system. Although microcomputers have become a common piece of equipment in Australian schools, this has not always ensured their use. Computer applications such as word processing, spreadsheets, databases and teacher administrative activities have all had some type of impact on meaningful

computer activities in schools which have microcomputers. However, in some school systems investigated it is becoming more obvious that they have had a limited effect on changing classroom instruction and practices.

Research by Wiske et al, (1988), Dickey and Kherlopian (1987), and Moonen (1987), has illustrated many interesting phenomena which hinder the use of computers in education. This section will briefly examine the historical factors which affect acceptance of technology and innovation in schools and relate these criteria to specific studies and reports of computer education.

As computers enter schools, which has been at a very fast rate over the last five to six years, some changes will and have occurred with teachers' work habits and in the organisational structure of the school. Moonen (1987), makes two points about computing in schools. He believes that computers should not be in schools because of the expense and also the skills are too advanced for children, and secondly, that it isn't happening anyway.

Government Policies

Prior to computers being placed in schools, external factors i.e. community perceptions and Commonwealth and State government policies played a major role in the

implementation of computer education. Khamis (1987), outlined the importance of the state and federal government policies, as these guide-lines establish the type of funding given and any training provisions.

The government's policies are usually the result of community attitudes, which could have been one vital factor influencing computer education in this state. The perceptions of industry, parents and local organisations will not only influence government spending but can also be a source of funding for schools themselves. In Australian schools the government's Computer Education Programme alleviated the problem of no computer hardware resources in schools. A quote from the Ministry of Education Annual Report 1987 - 1988, shows an extension of this idea.

In accordance with the Government's policy of making Western Australia the national leader in the provision of school computers, funding of \$5.5 million has enabled some 2 600 computers to be installed in schools. The provision of these computers will help to ensure that students gain understanding and experience in the use of computers, enabling them to cope adequately with an increasingly technology-based society. (Ministry of Education 1988, p.9)

Teacher Resistance to Change

Lidtke (1981) gives a historical perspective as to why teachers may be apprehensive about accepting this new technology. One of the concerns she outlined was teachers' resistance to change. This was supported by a study by Wiske et al (1988), where seventy six teachers from ten different sites were given questionnaires to determine how and why they used computers, the training and support available to them and their general attitudes towards the effect computers have on teachers and students.

Teacher profiles were established from the data that was analysed and interpreted. One profile component established by Wiske et al (1988), was "Deciding Not to Use Computers." The factors identified as influencing these teachers not to use computers were as follows:

- i. Bad training in the use of computer education.
- ii. Fears about the effects of computers on learning and teaching.
- iii. Lack of insight as to how this technology could improve the present curriculum.

These teachers had fears that computers may disrupt the valued student - teacher relationship. This is clearly illustrated by a typical comment made by a teacher who decided not to use computers. "He sees computers as a source of competition for students' attention" (Wiske et al., 1988, p.9).

Wiske (1988), supports the notion that a teacher's knowledge of appropriate uses of computers and their access to necessary resources and support will influence teachers' decisions to use the computer. This factor has been considered throughout the study as the teacher's background computer knowledge was investigated and the availability of computer hardware and software have all been noted.

Teachers' resistance to change may be a central variable which will need consideration in the study. Although it will be difficult to determine if this factor influences the teachers' computer education programme, through the teacher interviews, a teacher's attitude to the subject area will be established. The teacher's attitude may be directly linked to the type of computer education programme undertaken by the teacher. A positive attitude towards computer education may be related to the higher attainment of The Policy Document Goals.

Teacher Training and Knowledge About Computer Education

The amount of teacher inservicing and training received prior to the introduction of computers in the classroom setting will influence the teacher's decision to adopt computer technology in his/her classroom. Studies have reported if teacher's have received adequate training or on

going help and inservicing about how to use computers in the classroom, they are far more willing and competent to use it as an additional tool for student learning.

Khamis (1987), conducted a study with one hundred and twenty six Australian primary teachers. The research showed that factors influencing use can change as environmental factors alter. The data collection for this study began in 1985 with 81 primary teachers. The results showed the two most prevalent factors that limited use of microcomputers as being lack of funding and unavailable resources.

The same study was conducted with 55 Australian school teachers in 1987. This research clearly illustrated the two most prevalent factors that prevented the use of microcomputers; insufficient training and knowledge and inaccessibility to computers. *"It appears an 'elite' group of staff members dominate the use of microcomputers and restrict their availability to all teachers, consequently some staff members became frustrated and discouraged."* (Khamis 1987, p.10)

Anderson (1984), and Bear (1984), suggest the most limiting factor in educational use of computers is the lack of teacher experience and skill. A survey of teachers of mathematics, science and computers on the uses of computers in grades five to nine classrooms conducted by Dickey and

Kherlopian (1987), clearly displayed results which supported this view. The results showed the teachers' training related directly to the amount of use. The more comprehensive the training received the more likely the teacher was to integrate the microcomputer into the curriculum.

The accessibility of computers to seventy percent of the mathematics and science teachers in South Carolina was clouded by the report that only four percent of those teachers had received formal instruction on how to use this technology and fifty seven percent of teachers had reported that they had received no instruction what so ever. The small percentage of teachers receiving instruction may help explain why approximately half of teachers with access to computers did not use them. (Dickey & Kherlopian 1987, p.14)

Probert and Telfer (1986) believe the effectiveness of computer assisted instruction will be dependent upon the quality of teachers' knowledge on various issues. Teacher education will need to include the types of computer assisted instruction which are effective methods of instruction and teachers will need to be able to critically evaluate hardware and software.

Moonen (1987), also supports the phenomena that successful implementation of computer education will depend on teachers' preservice and inservice training.

It becomes evident that a major factor which limits integration of computers into the curriculum is the lack of teacher training in the use of computers. The research includes two variables, teacher training in the use of equipment and training in methodologies. This study examined teacher experience and expertise in computer education and a comparison was drawn between the teachers' computer education training and the quality of use evident in their classrooms. Pre-service and post-service computer education training has been examined and related to the teacher's progress along the continuum of indicators in The Policy Document.

Availability of Resources

The amount of computer equipment available will have an influence on the teachers' adoption of a computer education programme. Insufficient hardware, software and resources will not allow the teacher to successfully adopt this technology. For a successful computer programme the teacher must have adequate material.

Knupfer (1987), report an additional obstacle in the implementation of computers which may be critical in successfully implementing microcomputers in schools. Adequate amounts of hardware need to be available. This hardware needs to be carefully managed so the maximum number of students can have access to this equipment. The necessity for accessible computer equipment and practice time was evident in a study conducted in the United States with 510 grade six teachers. It stated that the majority of teachers interviewed believed that insufficient resources and curriculum time constraints hindered their use.

Seventy nine percent of teachers stated that their schools needed more computers and seventy seven percent believed that students did not receive enough instruction and practice time to become competent computer users. Over half of the teachers believed that the main reasons for lack of instruction and practice time were not enough access to computers and time restraints of the regular curriculum. (Knupfer 1987, p.6.)

The availability of resources could have a dramatic effect on the adoption of a computer education programme and it may have a limiting effect on the amount of instruction and practice time each individual student has on the computer.

The Western Australian Ministry of Education was aware of software and hardware resources available in the primary schools when The Policy Document was written. Therefore in Western Australian primary schools, the amount and type of resources available should not effect the adoption of The Policy Document.

Quality of Software

The quality of software can be another major factor limiting the amount of computer use. Educators do not have the programming skills necessary for software design and programmers are not aware of educational issues, therefore the quality of software may not be of the highest standard. The ideal software should be written by a team representative of education and computing.

In Western Australia, the Ministry of Education has shown its concern for quality software. It now has a team of officers who critically evaluate software and write a written analysis about the software package. This report is documented and sent to schools to be placed in the software resource file 'Software Focus'. It is continually updated with current software reviews about available software packages.

Dewsbury and Dean (1986), outline the importance of educational software being congruent with the child's development. The authors importantly noted that the software effectiveness is directly related to the teacher's ability. *"A poor piece of software can assure magical properties in the hands of an able teacher and an excellent piece can be emasculated if it is not used well"* (Dewsbury and Dean 1986, p.13).

Ediger (1988) states, *"Software and computers need to provide for unique ways of learning subject matter and skills which other materials cannot provide"* (p.9). The teacher must view the instructional capabilities as superior to other modes of teaching before this technology is fully accepted. Hence, there are many advantages in teacher inservicing or training to help teachers experience the potential of computers in the classroom. This will also allow them time to develop knowledge and skills about computer applications.

A change in teacher attitude through appropriate training, hardware resources, quality software and support in the use of the computer will change the amount of computer use. Fleer (1986) investigated school and community perceptions about the introduction of computer technology into the school. The study involved six Western Australian schools with substantial aboriginal enrolments. The findings

indicated that a number of elements influenced the willingness of the school communities to take up computer technology. These key factors are outlined:

"...the staff's perception of computer education; the support structures established within the school to afford its introduction; environmental constraints; the issue of suitable software; and the provision for the continuity of the established programme" (p.287).

The quality of computer software available at the educational setting to be studied, may influence the types of computer applications being used. If teachers believe the software can achieve an educational goal more effectively than another mode, they may use this instructional technology.

The appropriateness of computer software may also be a restrictive factor in the educational computer programme being undertaken. Teachers need to view the available software packages as suitable for implementation into the current curriculum. The Western Australian Ministry of Education has firm guide-lines for selecting software and has made available to every primary school the resource file, "Software Focus". This document has examined the quality of software available and has rated each package according to specific criteria. Therefore, the quality

software chosen by schools should be adequate if recommendations have been followed.

Administrator's Policy

Khamis (1987), and Wiske et al (1988), suggest another factor which may influence the type of computer education programme undertaken in a school. They recognize the role of the administrator's policy. The principal of the school needs to develop appropriate leadership strategies to provide direction, guidance, technical and financial resources for teachers.

The school policy is heavily influenced by the school administrators and therefore the strategies undertaken in the computer education programme will be largely a result of the principal's direction.

Wiske et al (1988), emphasize the necessity of support from administrators to sustain teachers' interest and innovation. Therefore, this study will not only examine the teachers' attitudes towards the computer education programme but also the school computer policy and the principal's attitude toward this subject area.

The literature shows that some major factors which limit implementation of computers into the curriculum are the lack

of teacher training in the use of the equipment, the need to change teaching style to use the new technology and teacher and school commitment to provide direction in policies. Once the above criteria have been adequately addressed in a school environment the type of computer use may change.

Computer Applications in Western Australian Primary Schools

The Policy Document suggests that students use the computer as an integrated educational tool for learning and problem solving in the context of daily classroom activities. The Western Australian Ministry of Education has broadly organised the goals in The Policy Document into teacher and student goals. The two student goals outlined were for schools students to become confident about using the computer as a learning tool; and secondly for students to use a computer regularly across the curriculum to achieve learning objectives and to solve problems in the context of their daily classroom activities.

The Western Australian Ministry of Education aims for all primary school teachers to be in a position to make decisions about the potential of computers to achieve their teaching objectives and enhance the learning of the students in their care. They outline in The Policy Document broad goals to achieve the above aim. The Policy Document outlines that teachers need to incorporate the regular use of the

computer in their own teaching / learning environment as a tool to achieve particular objectives. Teachers need to use their knowledge about sound teaching practice to identify potential software and to evaluate its usefulness in achieving their educational objectives. The final teacher goal outlined in The Policy Document is the use of the computer as a personal tool.

The student and teacher goals have specific outcome indicators to support the attainment of each specific goal. The Policy Document contains a continua of indicators which represent three process phases from initiation through to extending implementation. Each phase is ongoing and indicators can be applied to a single classroom regardless of the year level. This study has only examined the teachers' goal achievement and not the goal achievement by school students.

The following information displays the specific teacher goals outlined in The Policy Document, the outcome indicators and the sequential phases of achievement. The Policy Document organises a continua of indicators into three phases, however for the purpose of this study, an additional two transitional phases, lower transitional and higher transitional, have been included to incorporate teachers who cannot be clearly classified into one of the three specific categories suggested in The Policy Document.

Each of the five phases has specific teacher performance indicators to represent the achievement of a specific goal. Additional performance indicators have been included to represent the appropriate achievement of the goal.

The five phases are as follows:

Phase 1 - Limited Computer Use.

Phase 2 - Lower transitional. (Representing the transition between limited and moderate computer use)

Phase 3 - Moderate Computer Use.

Phase 4 - Higher transitional. (Representing the transition between moderate and extensive computer use)

Phase 5 - Extensive Computer Use.

Computer Goals

For all primary school teachers to be in a position to make decisions about the potential of computers to achieve their teaching objectives and enhance the learning of the students in their care by:

GOAL 1.

Incorporating the regular use of the computer in their own teaching / learning environment as a tool to achieve particular objectives;

OUTCOME INDICATORS:

- A. Extent to which documentary evidence indicates computer use as an integral part of classroom learning practices.

PHASE 1. (Limited Computer Use.)

- * No documentary evidence of planning for computer use.

PHASE 2. (Lower Transition.)

- * Documentary evidence of planning for computer use in the teachers' daily work pad.
- * Documentary evidence of planning for computer use in two of the teachers' subject programmes. (The software package title is listed.)

PHASE 3. (Moderate Computer Use.)

- * Computer use is a focus in the teachers' programme in some subject areas.
- * Documentary evidence that computer education has a separate programme to cover the skills which will be taught in this subject.
- * Documentary evidence that computers are used in some areas of the curriculum.

PHASE 4. (Higher Transition.)

- * Documentary evidence that computers are used to redress areas of inequity:
 - remediation
 - physical disability
 - gender - appropriate software
 - culture appropriate software
 - extension
 - special needs
 - special interests

PHASE 5. (Extensive Computer Use.)

- * A wide variety of documentation is evident indicating extensive use of computers across the curriculum and clearly linked to educational objectives, e.g.:

- teachers' programmes
- hardware rosters
- software registers
- attendance of professional development programmes
- student worksheets
- software support materials

OUTCOME INDICATORS:

- B. Extent to which classroom practice indicates computer use as an integral part of classroom learning practices.

PHASE 1. (Limited Computer Use.)

- * No classroom use of computers.
- * Computers are used singularly or aggregated according to geographical convenience / security rather than to maximize learning.
- * Use of computers is not related to educational objectives.

PHASE 2. (Lower Transition.)

- * Computers used only for Computer Assisted Learning.
- * Computers used for drill and practice only.
- * Computer Assisted Learning package becomes the catalyst for learning.
- * One area of special need is addressed.
- * Some computer use is clearly related to educational objectives.

PHASE 3. (Moderate Computer Use.)

- * Location and organisation of computers vary according to particular applications and teaching use.
- * All computer use is clearly related to educational objectives.

- * Students use software to do something for which they would normally receive adult help.
- * Use of an extended range of Computer Assisted Learning packages.
- * Limited use of tool software applications, (e.g. word processing for story writing).
Use of one of the following tool software applications:
 - Logo
 - databases
 - spreadsheets
 - word-processors
 - graphics
 - music
 - communications

PHASE 4. (Higher Transition.)

- * Software is used as a catalyst for extended, in-depth learning.
- * Computers are used selectively as most educationally desirable for the chosen learning experience.
- * Teacher prepares templates using applications software.
- * Use of two or more of the following tool software applications, e.g.:
 - Logo
 - databases
 - spreadsheets
 - word-processors
 - graphics
 - music
 - communications

PHASE 5. (Extensive Computer Use.)

- * Creative use of Computer Assisted Learning software.
- * Learning experiences are selected to ensure a variety of knowledge structures is explored, e.g.:

- sequences and chains
 - tree structures and loops
 - grids
 - graphs
 - pictures
- * Computers are used across the curriculum in a variety of ways.
 - * Application software frameworks are used by teachers to prepare learning experiences for their students (e.g. adventure generators).
 - * Extensive use of tool software, e.g.:
 - Logo
 - databases
 - spreadsheets
 - word-processors
 - graphics
 - music
 - communications
 - * Computer use is differentiated to meet the special needs and interests of individual students, e.g.:
 - gender
 - cultural background
 - ability and disability etc.

GOAL 2.

Using their knowledge about good teaching practice to identify potential software and to evaluate its usefulness in achieving their educational objectives.

OUTCOME INDICATORS:

- C. Extent to which teachers are confident in appraising software to meet their own teaching purposes.

PHASE 1. (Limited Computer Use.)

- * Teachers lack confidence in applying existing knowledge to decisions about software selection and use.

PHASE 2. (Lower Transition)

- * Teachers recognize drill and practice software and its limitations.
- * Teachers make limited use of Computer Assisted Learning packages to achieve educational objectives.
- * Teachers use simulation packages and support materials available in the school.

PHASE 3. (Moderate Computer Use.)

- * Teachers are able to trial new software and propose educational uses.
- * Teachers confidently make use of sources of evaluation and review in selecting software to support their educational objectives.

PHASE 4. (Higher Transition.)

- * Teachers are able to explain what constitutes good software and how it can be used across the curriculum to achieve their educational objectives.
- * Evidence that all software used has been chosen to achieve specific educational objectives. The software has been chosen after analysis of the needs of individual class members.

PHASE 5. (Extensive Computer Use.)

- * Teachers are confident in their selection and appraisal of software, they are willing to contribute their views to others via "Software Focus".
- * Teachers are able to use software creatively to meet the educational objectives beyond its intended use.

GOAL 3.

Using the computer as a personal tool.

OUTCOME INDICATORS:

- D. Extent to which teachers use a computer as a personal tool.

PHASE 1. (Limited Computer Use.)

- * Teachers do not use a computer as a personal tool.
- * Teachers are reluctant and tentative about using a computer.
- * Teachers do not see the relevance of a computer to their work.

PHASE 2. (Lower Transition.)

- * Teachers are aware of possible uses of a computer.
- * Teachers only use the computer for report writing to satisfy the school requirements.

PHASE 3. (Moderate Computer Use.)

- * The teacher uses a computer occasionally for specific purposes, e.g. letters to parents , activity sheets.
- * The teacher makes limited use of one application, e.g. word processing.

PHASE 4. (Higher Transition.)

- * The teacher makes multiple use of integrated packages.

PHASE 5. (Extensive Computer Use.)

- * The teacher uses the computer for numerous daily tasks, e.g.:
 - parent letters
 - class lists
 - faction lists
 - report writing
 - programmes
 - budgeting
 - student work sheets
 - memos to principal
 - excursion and camp letters
 - annual handbooks
 - communicating electronically with other teachers / District Office
 - flyers and handouts
 - graphics
 - silk-screen stencils
 - labels
 - mail merge
 - stock lists
 - student records

Computer education has become part of the curriculum in all Western Australian Primary Schools through the availability of resources and a set ministerial policy. Therefore it is important that students have equitable access throughout classes and schools. The type of computer applications used should be related to the specific goals outlined in The Policy Document.

This study identified the most common type of computer application used in the school and it should become apparent why these computer applications have been undertaken. The computer's role may be influenced by the teacher's perception that the computer can offer the learner immediate feedback. A learning objective can be taught or mastered

through computer use or a curriculum goal will be achieved through its application.

It is hoped that this case study investigation into the computer education programme at a primary school which has a computer school policy, will help identify common patterns of computer use unique to that population and analyse the existing integration into the current curriculum. The study also proposed to suggest what goals are being achieved by teachers in relation to The Policy Document.

This study evaluated the extent to which teachers are achieving the goals outlined in The Policy Document and the factors which may be contributing to this achievement. Dench (1990), outlines the ministry's goal to have The Policy Document fully operational in the schooling system by the end of 1990. Adaptions made to the school programme may better address the goals outlined in The Policy Document and ultimately enhance the learning environment for the students' computer use.

CHAPTER 3

Methodology

Design of the Study

The model of enquiry adopted by the study was a case study approach within a multi-method design. Stake (1978), states that *"case studies will often be the preferred method of research because they may be epistemologically in harmony with the reader's experience and thus to that person a natural basis for generalization."* (p.5).

The bounded system of this case study was the school environment. All cases were unique and uniquely set in their natural situation. Therefore, generalizations made from this research must be tentative. The case study approach used a variety of techniques to provide the researcher with rich descriptive data about contexts, beliefs of participants and the activities which occurred within the setting. Adelman et al (1976), outlined the many techniques and procedures commonly used in a case study to give a holistic view of the phenomena to be studied. The techniques and procedures used in this case study were participant and non-participant observations, teacher interviews, Log Book data collection, analysis of the teachers' programmes, and analysis of school policy documents.

This multi-method approach allowed for data collected from one source about the computer education programme to be verified or expanded on through data collected from other sources. The triangulation of results occurred by comparing Log Book data, teacher interview notes and teacher's computer education documentation (teachers' formal programmes and daily lesson notes) to show the accuracy of the data gathered.

Specifically, the model of enquiry used in this study generated data to formulate an accurate account of the total computer education programme for a school. Data was collected to give individual teacher profiles and a whole school profile of computer use. Factors which had contributed to goal achievement were recognized for a six month period.

Subjects

Population

The school was selected because computers were found in operation in all classrooms. A school policy was established in its 1988 School Development Plan where it had prioritised computer implementation as one of the school priorities. This school displayed direction and emphasis in computer education.

This metropolitan school had approximately 440 students. The school teaching staff consisted of a principal, a female and male deputy, 12 full time primary teachers, 4 tandem teacher combinations, a 0.6 administrative relief, a 0.5 support teacher and two pre-primary teachers.

This school had a very supportive parent community. The parents supported the school financially in fund raising activities and most school development programmes. The school's Parents and Citizens Association fully supported and offered financial support in the form of funds to purchase computer hardware to assist the School Development Plan Project, 'Computer Introduction to the School', in 1988.

Initially in 1987, the schools Parents and Citizens Association made funds available to purchase four BBC microcomputers. The Western Australian governments Computers in Education Programme (1987), offered a dollar-for-dollar subsidy on approved hardware up to \$2 000, this provided part of the funds needed to purchase four BBC microcomputers. The Parents and Citizens Association subsidised the remaining amount of funds needed for the equipment and subsequent equipment.

As a result of the Beazley Report (1986), recommendations for school based decision making, the School Development

Plan Project for this primary school in 1988, focused on introducing computers to the school. The project involved the purchase of ten additional BBC microcomputers, an additional printer and software to aid computer assisted learning.

The School Policy 1988, allocated ten thousand dollars to purchase computer hardware and software resources. This was approximately half of the total funds allocated to school equipment. The proposed spending for computer hardware and software 1989, was an additional four thousand five hundred dollars. This displayed the high priority given to the school computer education programme.

The Regulation 188 position from 1987 - 1990, which allocates one teacher additional responsibilities for additional pay, has been in the role of school computer co-ordinator at this school. The school computer co-ordinator's role is to provide teacher support to encourage computer use and purchase on going equipment that is needed for the programme. Again, this stresses the importance this school places on "its" computer education programme.

The school computer education project director 1988, was involved in the establishment of a computer laboratory. Two empty classrooms were set up as the computer resource room. It had six power points installed and security bars were

attached to the doors and windows. Teachers were encouraged to maintain a "hands on" approach to the computer assisted learning programme established while the computers were in the computer laboratory. In 1989 the computers were placed in a stand-alone situation in each classroom, which had continued in 1990.

The selected sample consisted of all classroom teachers at the school, who had full time access to one computer and software resources. Each of the teachers was required to keep a log book account of the classes computer activities for an eight week period. Once these accounts were collected the teachers were interviewed and their computer education programmes were analysed for each class setting.

The principal at this school setting was given a similar questionnaire to analyse his view on computer education at this school. A comparison has been drawn between the principal's expectations and computer practices by the school staff.

Data Collection

The data for this research involved using a number of different data collection processes to determine the computer education programme for this school. A pilot study

was conducted to further develop and refine instruments that were used in the data collection process.

Prior to the commencement of the project, a pilot study was conducted with two individual teachers. This pilot study was used to develop instruments for data collection to help ensure all aspects of the computer programme were closely monitored. The information obtained helped determine that all necessary data was collected to indicate what is actually happening within the computer programme. The following methods of data collection were used throughout the pilot study and proved successful:

1. Log Book.
2. Teacher and Principal Interviews.
3. Examination of Documentary Evidence.
(Programmes and School Policy.)

Log Book

The log book consisted of elements which recorded data relevant to frequency and time periods of microcomputer use by students. The items included in the log book were date, time, students name, computer activity, instructions given prior to the activity, follow-up activities and the teacher's subject lesson at the time of the computer activity. This instrument recorded valuable data for establishing a teacher's profile of computer use and goal achievement.

The specific items developed were used to measure the amount and type of computer use for each classroom. The log book data was to be interpreted to determine student computer access and the other dimensions of computer goal achievement. Whether the usage was individual, group or class instruction was also to be evident. Log book data illustrated unstructured time use by students i.e. break time computer use and \ or before and after school use.

The second main data element analysed from the log book entries was the type of computer applications used as outlined in The Policy Document. Table 1 lists from The Policy Document computer applications. This information was used for categorizing teacher's computer use into phases of implementation. These applications were directly related to the performance indicators suggested in The Policy Document.

The data entries in the log book were made by the students using the computer. This was appropriate for year levels three to seven with teacher direction and assistance. Year levels one and two had the log book entries completed by the classroom teacher or teacher's aid.

Table 1: The Policy Document Computer Applications.

1. Adventures
 2. Simulations
 3. Word Processing - Drafting
 - Editing
 - Copying
 4. Databases
 5. Spreadsheets
 6. Drill and Practice
 7. Logo
 8. Utilities
 9. Educational Games
-

Teacher and Principal Interviews

In-depth interviewing was used with every classroom teacher in the school. This data collection method had the opportunity of building up rapport with the teachers concerned and allowed for some flexibility. From results obtained from log book entries and initial interviews additional relevant information was gained and followed up by further interviewing.

The school principal was interviewed to ascertain his views towards the computer education programme in the school. The school policy and funding allocation was established through these interviews. In organizing the interview, the participants were informed about the confidentiality of the interview. Interviews were be conducted on a one-to-one basis in a situation that offered minimum distractions, at a mutually convenient time. With the interviewee's permission, interviews were recorded on tape and key responses or words were written down to help increase internal validity.

Initial teacher interviews focused on teacher characteristics involving teaching background, computer training, knowledge of microcomputers and their applications and attitudes towards the role microcomputers played in the classroom (see Appendix C).

A "Comparative Attitudes" questionnaire was conducted with both the classroom teachers and principal, to establish their individual attitudes towards computer education (see Appendix B).

The investigation into the teachers' use of the computer as a personal tool involved the teacher choosing their place on the continuum outlined in The Policy Document (see Appendix D). Use of the computer as a personal tool was recorded by teachers listing all their personal use of the computer.

Possible applications outlined in The Policy Document were shown to each individual teacher.

Through semi-structured interviews the teachers' and principal's views about computer education were discussed and all documentary evidence was examined to further inform these views.

Examination of Documentary Evidence

The school computer education policy was closely examined to determine goals outlined for achievement in this subject area. Teacher's personal programmes, timetables, rosters and any other relevant computer education planning were viewed to establish the type of formal planning evident.

In the literature such influences as, teacher expertise and attitude, school and classroom resources and the existing curricula, all place constraints on the computer integration into the classroom curricula. These factors may effect the dimensions of student access time and the type of computer applications being used in the various classroom settings.

Organisation of Data

The Policy Document contained important reference material for this study. Goals and outcome indicators outlined in The Policy Document were used to make comparisons with data obtained at the school studied. The data obtained through the teacher interviews, log book data and examination of documentary evidence were used to assess and compare the teachers' phase of achievement on the continua of indicators listed in The Policy Document. (see Appendix D).

Computer use phases were established according to those outlined in The Policy Document. The pilot study revealed the need to include transitional phases. The Policy Document organised computer use into three areas: limited, moderate and extensive computer use. These phases were used and a transitional phase was included between limited and moderate, named lower transition and moderate and extensive, named higher transition. Additional performance indicators about the teachers' stage of achievement were included in each phase, to ensure teachers were accurately classified. Phases of progress were classified from phase one to phase five depending upon the teacher's attainment of each particular goal. Specific performance indicators were used to accurately assess each teacher's phase of goal attainment.

Teacher profiles were established from the collation of all data gathered. Profiles were organised into a table showing achievement attainment for each particular goal. The teacher's place on the continuum of indicators outlined in The Policy Document was judged and shown on a table. This has been displayed below as Table 2.

This table displays the three teacher goals as outlined in The Policy Document. The four outcome indicators have been classified as A, B, C and D, and are used to measure the achievement of each goal. Outcome Indicators A and B are related to Goal One and assess the degree to which the teacher uses the computer as a tool to achieve particular objectives. Outcome Indicator A examines the extent to which documentary evidence indicates computer use, whereas Outcome Indicator B examines the classroom practices indicating computer use as a tool to achieve particular objectives.

Goal Two was related to the teacher's knowledge to identify potential software and to evaluate its usefulness in achieving their educational objectives. Outcome Indicator C evaluates the extent to which teachers are confident in appraising software to meet their own teaching purposes.

Table 2 : Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
1. Incorporating the regular use of the computer in their own teaching / learning environment as a tool to achieve particular objectives.	A. Extent to which documentary evidence indicates computer use as an integral part of classroom learning practices. B. Extent to which classroom practices indicates computer use as an integral part of classroom learning practices.	1. Limited Computer Use 2. Lower Transition 3. Moderate Computer Use				
2. Using their knowledge about good teaching practice to identify potential software and to evaluate its usefulness in achieving their educational objectives.	C. Extent to which teachers are confident in appraising software to meet their own teaching purposes.	4. Higher Transition				
3. Using the computer as a Personal Tool.	D. Extent to which teachers use a computer as a personal tool.	5. Extensive Computer Use				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.					
1B Degree of Computer Use	B Classroom Practices.					
2 Software Appraisal Skills	C Teaching Practices.					
3 Use as a Personal Tool	D Personal Practices.					

The final goal named Goal Three, related to the teacher's ability to use a computer as a personal tool. Outcome Indicator D examined the extent to which teachers use a computer as a personal tool.

Individual teacher profiles were classified using Table 2 to show the teacher's attainment of each outcome indicator and these were assessed in phases of progress.

CHAPTER 4

Results

School Profile

The principal had been at this school for the past two and a half years. For six years he had computer resources available in the schools where he had been the administrator. The principal has not completed any formal computer education courses nor received any training in this area. He had attended a two hour inservice session conducted by a software demonstrator organised on one of this school's Professional Development Days in 1989. The principal preferred to discuss school policies and claimed these to be his own.

School Policy for Computer Use

The policy on computer use in the school stated that the teachers needed to identify and use any software program suitable and compatible with their programme of education. They were used as a classroom machine and as an aid in individualizing the programme. The school's computer policy was always changing and it was adjusted to the needs of the staff and the children at a particular point in time.

The regulation teacher was in charge of the school's computer education programme. He was given half a day per week to arrange and organise the materials to support the

programme. As it was a priority programme he assisted other staff members in this area.

School Computer Facilities and Funding

In the beginning of 1988, when the principal first became an administrator at this school, it had already been decided by the previous staff to devote a large part of the school funds to the purchase of five computers. In addition, the school was to receive three computers from the Ministry of Education. The school already had six computers, which made a total of fourteen computers, one for each individual classroom. The previous principal had organised to establish a computer laboratory in the school in two spare classrooms. This arrangement gave the school the option of placing the computers in a laboratory situation or in a stand alone arrangement.

The Computer and the Curriculum

The principal stated a belief that, *"The computer allows for a more individual focus on areas of weakness provided the programme is selected to suit the individual's needs."* He believed that the computer provided relief to the teacher like other audio visual equipment and was another learning aid to be utilised by the teacher.

Teacher One

Teacher One had eight years of classroom teaching experience, the last four years have been with the availability of numerous computer resources. This teacher possessed limited training in the area of computer education. The extent of training in this area included a two hour professional inservice conducted at the school by a professional computer company and three training sessions with the school computer co-ordinator.

Teacher One had access to a personal computer but did not use this IBM compatible machine. She did not use the computer for tasks unrelated to her teaching. The computer was only used for report writing and this was to satisfy school requirements.

Computer Management

Computer timetabling entailed a one hour weekly session. Two computers were used for this session in conjunction with other small group maths activities. Four maths groups and one computer activity were scheduled for the lesson. The children were placed in groups of six and worked through an activity on a rotational basis each week with a parent helper. The children were often required to complete follow up activities related to their computer work.

Each individual child spent a sixty minute session on the computer per term. Children who completed set classroom tasks early, had the opportunity at a non timetabled time, to use the computer with an assigned package left near the computer station. This package would have been demonstrated to the children during the maths computer activity session. The computer software packages were selected to reinforce concepts already covered in the classroom learning objectives. Results indicated that Teacher One had only used simulation and drill and practice computer software packages. The computer education programme in this classroom had no formally written documentation.

Rationale for Computer Use

Teacher One used the computer as part of her classroom teaching strategy to reinforce skills covered in class. Teacher One stated, "The role of the computer in the classroom learning objectives is in the reinforcement of concepts covered."

This teacher believed that the computer played a very important role in the children's education and saw computer education as a subject area to be taught on its own and a strategy to reinforce the present curriculum.

Teacher One had mixed feelings towards the general use of computers. She would have ideally liked a computer specialist teacher to teach computer education in a set time slot and also had the availability of one computer for individual classroom use.

Policy Document Goals

The teacher's place on the continuum is shown in Table 3. Teacher One had no documentary evidence of planning for computer use.

Table 3: Teacher One's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.	X				
1B Degree of Computer Use	B Classroom Practices.			X		
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.		X			

Location and organisation of computers varied according to particular applications and teaching strategies used. Teacher One clearly related computer use to the educational

objectives she wished to achieve. Teacher One was able to recognize drill and practice software and its limitations, however she did not confidently review software packages to evaluate their educational objectives.

Factors Influencing Computer Use

Teacher One perceived the computer as a tool which had a high motivational influence on the children's learning. The children were keen to use this instructional aid and Teacher One suggested it was an effective alternative method for practising skills taught.

The amount of computer resources available at the school affected Teacher One's computer programme. She maintained that every class needed two computers to implement a successful computer education programme. Teacher One demonstrated a preference for a group of computers to be set up in a laboratory. She suggested that software resources were also limited in her teaching level and more software packages were needed in the area of language. Teacher One recommended that software packages should be assigned to particular year levels to ensure there were adequate materials for subsequent year levels.

Teacher One suggested that she had difficulty integrating software packages into the total curriculum and needed

further training to fully develop her own computer skills. She was apprehensive about computer reliability and preferred a specialist teacher to take her class's computer education programme.

Teacher Two

Teacher Two had twenty two years of classroom teaching experience and was the school's male deputy principal. The last ten years of his teaching had been with the availability of computer resources. Prior to this year, Teacher Two had no involvement in a computer education programme in his class, nor had he used computers for any administrative tasks. Teacher Two did not have access to a personal computer and made no use of the computer for tasks unrelated to his teaching. Teacher Two's previous schools all had a computer coordinator or a specialist teacher who was in charge of the school computer education programme. Teacher Two's initial teacher training involved no computer education training. He first became involved with computers whilst teaching at his previous school. He did not take the computer education programme as the specialist teacher was required to take all computer lessons. The classroom teacher was expected to be present at the lesson to increase familiarisation with available software packages available and to improve personal confidence in computer usage.

The computer coordinator at Teacher Two's previous school also held a number of after school inservice courses for staff members. These were regularly attended by Teacher Two. A technical college introductory course related to computers had been completed. Also an Introduction to Computers inservice was completed at a deputy principal meeting. A further one day introduction to computers inservice was completed at the Western Australian College of Advanced Education.

This year was the first time Teacher Two used the computer as a personal tool. He used it to write the children's first semester reports using the school's computerized reporting package.

Computer Management

Children worked on computer activities in pairs. Teacher Two nominated the first two children whose names appeared on the roll. This procedure was repeated until the whole class completed the set computer activity. All class members had the opportunity to use the computer in semester one. The children were rostered on the computer according to their position on the class roll. The children had the opportunity to use the computer on a particular activity for a set period of time. The computer was also used for the extension of children who completed the set class activity early. A

software package was chosen related to the subject matter completed in the lesson and used for the reinforcement of the concept taught.

Students did not produce any written work on the computer, however other work completed on the computer was not formally assessed. The only requirement was that the children followed the instructions on the disk given to them and that they related to it as an extension of what they had been doing in class.

Documentation for the log book indicated that drill and practice packages were the only type of computer application which had been used. The computer education programme in this classroom had no formally written programme. The software packages used were listed in Teacher Two's daily work pad.

Rationale for Computer Use

Teacher Two stated, "The computer is a good extension for the children's learning and as a tool, is a necessary learning instrument."

He believed computer education played a vital role in the curriculum of every subject area as it provided additional activities to reinforce a concept or skill.

Teacher Two suggested that at the primary school level, computer usage was just an extension of the curriculum and that it should be integrated into every subject area in order to give primary school children a foundation for high school computer usage.

Teacher Two would have liked to have seen computer education made a specialized subject area with a specialist teacher. He also stated that the school's computing resources would need to be placed in one teaching area and a school timetable drawn up for each classroom's specific computer education time slot.

Policy Document Goals

The teacher's place on the continuum is shown as Table 4. Teacher Two was in Phase 2 - the transition between limited computer use and moderate computer use for the three computer education goals.

The only documentary evidence of planning for computer use was in Teacher Two's daily work pad. The package title was

listed in the particular time slot which was to be used by the children.

Computers were used for drill and practice purposes only. Teacher Two was able to recognize drill and practice software and its limitations. He made limited use of Computer Assisted Learning packages to achieve educational objectives.

Teacher Two only used the computer as a personal tool for report writing, which was to satisfy school requirements.

Table 4: Teacher Two's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.		X			
1B Degree of Computer Use	B Classroom Practices.		X			
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.		X			

Factors Influencing Computer Use

The limitations of computer resources had an effect on the computer education programme conducted by Teacher Two. He maintained that the resources available did not enable the maximum number of children to be using a computer at any one time. Therefore, the use was limited by the number of computers in each classroom.

Time restraints limited the amount of use Teacher Two performed on the computer. New subject areas were constantly being introduced, like growth and development, environmental education, drug awareness etc. This teacher believed these factors limited the time accessible to cover all areas and use the new technologies available.

Teacher Two suggested that the physical arrangement of the classroom did not avail itself to computer hardware. The reflection from the windows and the positioning of power points all placed restraints on an effective computer education programme being implemented.

Teacher Two had limited training in the area of computer education and recommended further inservicing with the computer co-ordinator to develop his knowledge of available

software and possible integration of subjects with the computer education programme.

Teacher Three

Teacher Three had fourteen years teaching experience, the last five years had been with the availability of computer resources. This teacher completed a programming unit at the Western Australian Institute of Technology whilst completing his original science degree. Through his role as the school's computer co-ordinator, he attended regional network meetings which were held once a term during 1988 and 1989. During a professional development day in 1989, Teacher Three attended a two hour inservice conducted by a software demonstrator from a local computer supplier. This seminar focused on computer timetabling and software package integration into various subject areas.

Teacher Three did not own a personal computer, however he frequently took home one of the school's computers for his own use. He occasionally used the computer to write private letters and his children often used the adventure software packages on the computer.

Computer Management

There was no set time for computer use in Teacher Three's classroom. On most occasions, the computer was available for use throughout the day except if there was an introductory lesson being taken by the teacher.

Teacher Three selected a software package after previewing the software prior to its use in the classroom. The children worked through the package and then recorded the package's name and the day and date it was used. The access to the computer was determined by the children's own initiative. The computer groups were determined by the children and they worked in small groups or individually depending on the software package.

The software applications used by the children in Teacher Three's class this year, were word processing, drill and practice, simulations and desktop publishing. There were set requirements to be met by the children prior to using a software package on the computer. Word processing and desktop publishing activities, required the children to produce a hand written draft prior to typing their work into the computer and producing a typed copy. Drill and practice and simulation packages required the students to have read the information booklet as part of their language development before using the package.

The computer education work was not formally assessed. The end products produced through desktop publishing and word processing were formally assessed. Teacher Three believed that the simulation packages were self assessing because whether the student completed the activity determined whether he or she was able to achieve it.

Teacher Three stated that the main management problem in his computer education programme was the constant encouragement needed to get students to use the computer for purposes other than games.

He had to eliminate the games packages from the disks available to the children. Teacher Three believed a major disadvantage of computers was that so many children in his class had computers at home, hence the motivating effect which was once there had now gone.

Teacher Three formally planned computer activities in his written programmes. Written documentation for computer activities were included in the appropriate subject area programme. The written expression programme included the types of word processing and desktop publishing activities to be completed by the children during the term. The maths programme made reference to drill and practice packages which were integrated into the maths activities to reinforce the concepts covered during the term. The social studies

programme included computer activities, such as simulation packages, applicable to the topic which were completed by the children.

Teacher Three used the computer as a personal tool. He used the word processing facilities on the BBC Micro computer to write his programmes, produce student activity sheets and develop annual handbooks. The children's reports were also written using a computer reporting package available at the school.

Rationale for Computer Use

Teacher Three used computers in his teaching because he believed it was a modern teaching aid that the children needed to be familiar with and know how to operate. He vindicated that computers were part of the educational programme and that he had a responsibility to use them as an additional teaching strategy. Teacher Three suggested that by using a computer software package to reinforce a concept taught in class, children attained a better understanding of the concept.

Teacher Three saw the classroom computer in a supportive role in his teaching and another available teaching tool to be utilized by the children in his classroom. *"I believe the role the computer plays in the curriculum is a role where it*

supports the teacher. The teacher can use it but the computer does not become the centre of the classroom. It is just another tool for the teacher to use to make their job a bit easier."

Policy Document Goals

The teacher's place on the continuum is shown as Table 5. Teacher Three had documentary evidence that computers were used in some areas of the curriculum. His computer education programme was incorporated into the other subject areas.

Teacher Three prepared templates using application software and the computer was used selectively to enhance the chosen learning experience.

Teacher Three in his role as computer coordinator, chose software after analysing the needs of individual class teachers. He was able to explain what constituted good software and how it could be used across the curriculum. Teacher Three used the computer as a personal tool for numerous daily tasks.

Table 5: Teacher Three's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.			X		
1B Degree of Computer Use	B Classroom Practices.				X	
2 Software Appraisal Skills	C Teaching Practices.				X	
3 Use as a Personal Tool	D Personal Practices.					X

Factors Influencing Computer Use

The school requirements were a major contributing factor in his computer education programme. Teacher Three believed he had a responsibility to use the computer as part of his teaching programme because the school had spent a large amount of funds on purchasing computer equipment for each classroom.

Secondly, Teacher Three used the computer as a learning aid in his classroom teaching because he believed that all students needed to know about computers and know how to use them effectively.

A major obstacle in Teacher Three's computer education programme, was that so many children in his class had access to computers at home and consequently the motivational influence had diminished. He stressed the point that he now had to motivate the children to use the computer and to impress upon them the usefulness of the computer as a learning tool.

Teacher Four

Teacher four had nine years teaching experience and was teaching in tandem with another teacher at this school. She shared a class with Teacher Five and had been teaching for one year at this school. This teacher had no formal computer education training in her initial teacher training course. She had attended an evening introductory computer course and two professional development courses. These courses were an introduction to computer education and included a workshop session on a word processing application (Edword). Teacher Four had access to a personal computer outside of school but did not use it to complete any tasks.

Computer Management

Teacher Four taught for 0.4 of the total teaching time in this classroom. During this time there was no computer use in the classroom. The other tandem teacher, Teacher Five, was totally responsible for the computer education programme.

Rationale for Computer Use

Computers did not play any role in the classroom learning objectives in Teacher Four's classroom teaching time.

Policy Document Goals

The teacher's place on the continuum is shown as Table 6. Teacher Four's computer goal achievement clearly suggested that she was in Phase 1 for all computer goal achievement. Phase 1 emphasised limited computer use.

There was no computer use by this classroom teacher in both classroom activities and her own personal use. At this stage there were no signs of moving out of Phase 1 to Phase 2 of computer goal achievement.

Table 6: Teacher Four's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.	X				
1B Degree of Computer Use	B Classroom Practices.	X				
2 Software Appraisal Skills	C Teaching Practices.	X				
3 Use as a Personal Tool	D Personal Practices.	X				

Factors Influencing Computer Use

Teacher Four did not use computers in her teaching because she was not confident enough to use them. Even though she had completed a limited number of computer courses, it had not been sufficient to develop her confidence or knowledge in this area. Teacher Four believed there were adequate resources and support for computer use in this school. These two factors did not influence her use of the computer.

The main contributing factor influencing Teacher Four's limited computer use, was the lack of time to become familiar with operating the computer and resources available to be used on the computer.

During the interview, Teacher Four stated, " I would like to, and definitely intend, getting more experience and starting to use the computer. It is just a matter of the time factor because it does take a lot of your own time to get familiar with it and I just haven't got that at the moment."

Teacher Five

Teacher Five was a tandem teacher who worked for 0.6 of the teaching time. She had taught for eight years full time and four years part time. Teacher Five had taught with the availability of computer resources in the classroom for a total of one and a half years.

She possessed full time access to a personal computer at home and used her home computer for tasks both related and unrelated to her teaching. For school related activities, Teacher Five used the word processor to type up the children's stories so that they could see their work in typed print. The word processor was the main use for tasks unrelated to her teaching.

Teacher Five completed two introductory computer education inservice courses. The first course was a two hour session

at a private school and the second was a school initiated course organised by the school's computer co-ordinator for a professional development day. The latter two hour inservice was conducted by a software demonstrator from a local computer supplier and focused on various methods of computer timetabling and computer activities relating to a number of software packages.

Computer Management

The computer was used once a week in a one hour block for computer education in Teacher Five's classroom. The first computer education lesson was used to introduce the software package that the children would be working with in the following week.

This arrangement was to ensure the children in the class were familiar with the requirements needed for the computer activity. During that week, groups of five children rotated through the package while the other students in the class completed the written activity associated with the software package. All children in the class completed the specified software package before the class moved onto a new piece of software.

The written activities associated with the computer education programme were either taken from the written

materials contained in the package or if suitable material was not available, Teacher Five would construct her own activity worksheets.

The computer education work was not formally assessed by Teacher Five. The written work associated with the computer education programme was marked and stored in a computer folder.

A formal computer education programme was written for each term by Teacher Five. The documentation included the children's computer groups for the term and the software packages, activities and lesson topics for each week. The computer education programme was organised as a subject area in its own right and was not integrated into other curriculum areas. Teacher Five used simulation software packages in the children's computer education lessons.

Rationale for Computer Use

Teacher Five stated that she used computers in her teaching programme for a number of reasons. Firstly she believed computer education was part of the curriculum and teachers had a responsibility to include it in their formal teaching programme. The second reason was that she believed computer education was valuable because in a changing world, children were going to need computer skills as they get older.

Policy Document Goals

The teacher's place on the continuum is shown as Table 7. Teacher Five had documentary evidence stating that computer education was taught as a separate subject to cover the skills associated with it. All computer use was clearly related to educational objectives.

Teacher Five was able to successfully trial new software and propose educational uses. This skill was highlighted when Teacher Five developed support materials to accompany software packages.

Table 7: Teacher Five's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.			X		
1B Degree of Computer Use	B Classroom Practices.			X		
2 Software Appraisal Skills	C Teaching Practices.			X		
3 Use as a Personal Tool	D Personal Practices.			X		

Teacher Five used the computer as a personal tool to type children's stories, personal letters and for school report writing.

Factors Influencing Computer Use

Teacher Five started using the computer in her classroom teaching when she commenced teaching at the school. She found it necessary to teach computer education as it was a requirement of the school development plan. In addition, the school administration encouraged co-operative programming, which meant that she needed to work from the grade level computer education programme developed in co-operation with the other year level teachers.

Teacher Five had received encouragement from her home environment to use the computer for tasks both related and unrelated to her teaching. This was due to the fact that her husband was a computer consultant.

Time was a crucial factor in determining the amount of computer use Teacher Five included in her teaching programme. She would have like to use the computer more extensively and to integrate it into other subject areas. Teacher Five required more time to become familiar with the software packages available at the school and believed she needed a greater amount of time to integrate software packages into the current curriculum and syllabi.

Hardware resources were limiting the amount of computer use administered by Teacher Five. However, if more computer

terminals were made available, a problem would exist relating to inadequate physical space being available in the classroom environment. Teacher Five's comments reflected her desire to have more hardware and software resources and the acknowledgment of the lack of physical space.

"It would be nice to have two or three computers in the classroom but I haven't got the room for the one that I have got. If I had more computers it would make my computer education programme easier to operate, but you can't just get another two computers and push them into the same little classroom. I would like to see more software for the middle school, so we could have all the junior primary software available for our use only and also more junior primary packages."

Teacher Six

Teacher Six completed most of his teaching career with classroom computer resources being available at the school. He had taught for seven years and for five of those years, he used computers in varying degrees as part of his classroom teaching.

Teacher Six's initial teacher training included the completion of one introductory computer education unit, which was completed in the final year of his teaching diploma. At his previous school he attended two short inservice courses conducted on the school's professional development days. These courses involved an introduction to computer education in the classroom, integration of software packages and how to effectively use a word processing package for creative writing activities.

Computer Management

The log book results collected over term one displayed no computer use by the children in Teacher Six's class. He suggested the reason for an absence of a computer education programme during term one was due to the large class size, the time needed to become familiar with the children in his class and the school's operational procedures. These factors influenced his decision not to set up an operational class computer education programme.

During the interview session he explained the type of computer usage for the class in term two, however no log book information was collected to verify the accuracy of this information.

Teacher Six stated that during term two, the children were randomly assigned a number in the morning prior to their maths lesson. During the formal maths lesson time, the children went on the computer in their number order to complete a maths drill and practice package. The results scored from this activity were then recorded on a class graph.

Rationale for Computer Use

Teacher Six saw the role of the computer in the classroom as an added mechanism for learning. He saw the computer as an additional strategy to be implemented by the teacher to help achieve specific objectives. Teacher Six suggested that ideally the classroom computer should be used as an alternative teaching tool.

He stated, "Computers should be used as a tool for learning, communication and as an aid in administration practices. Computer education can be a subject on its own and also as an integrated subject."

Policy Document Goals

The teacher's place on the continuum is shown as Table 8. Teacher Six had no documentary evidence of planning for computer use. Term one data indicated no classroom use of

computers and term two indicated that the computer was used for drill and practice only.

Table 8: Teacher Six's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.	X				
1B Degree of Computer Use	B Classroom Practices.		X			
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.			X		

Teacher Six used a variety of software packages in previous years of computer use, however information collected disclosed that he was able to recognise drill and practice software and its limitations.

Teacher Two used the computer as a personal tool for specific purposes, e.g. student worksheets and class lists. He also used the computer for report writing.

Factors Influencing Computer Use

Teacher Six acknowledged a concern that computers are being widely used in society and therefore children needed to be

taught how to use them or they would be disadvantaged. Teacher Six felt confident with the various computer applications and conceded that he should have been using the computers more extensively. *"I would grade myself as being reasonably familiar with all the procedures. Probably the amount that I do on the computer in the classroom does not reflect my background knowledge."*

The lack of log book entries indicate that other teaching conditions need to be satisfied prior to a computer education programme being undertaken by Teacher Six. His concern for his large class size, being a new staff member at the school and other classroom management matters took priority over the implementation of any computer education programme.

Teacher Six recognised the support offered by the school administration by nominating a school computer co-ordinator and giving the co-ordinator time to organise the school's computer resources. Therefore the school support, hardware and software resources had not limited this teacher's computer education programme implementation.

Teacher Six described how the availability of computer resources had improved over the time he had been teaching. *"When I first started using computers it was normally one or two computers in a school. Now in the last couple of years*

it has got to the stage where every single classroom has got one."

The availability of time was a limiting factor in Teacher Six's computer education programme. He suggested there were so many other subject areas to be catered for that his computer education programme was one of the first subject areas to be dismissed.

Timetabling computer access and planning computer activities were two areas in which Teacher Six believed he needed assistance to maximize the benefits for the children using the computer.

Teacher Seven

Teacher Seven had taught for ten years full time and four years part time. She held a 0.5 tandem teaching position at the school sharing a class with Teacher Eight. Teacher Seven took the class for the morning session until lunch time every day. She taught at this school for eight years and had classroom computer resources available for the past five years.

Teacher Seven received very little formal training in the area of computer education. She only completed a two hour inservice conducted by a software demonstrator. This seminar was conducted on a school professional development day during 1989. The seminar focused on computer timetabling and integration of various software packages into the curriculum.

Teacher Seven had access to a personal computer at home but did not use it unless she had to. She preferred to use a typewriter as an alternative to the computer.

Computer Management

Teacher Seven played a very limited role in the class computer education programme. Teacher Eight, the tandem teaching partner, was responsible for planning and timetabling the class computer education programme. Her tandem teaching partner wrote the formal computer education programme, organised the computer roster and configured the hardware system for the children to use during the morning session.

Management of the computer education programme was arranged on the basis that the more competent tandem teacher would be in charge of planning and conducting the programme.

Teacher Seven's role was to allow children during her morning teaching time, to work in their small rostered groups on the particular software package set up by Teacher Eight.

Rationale for Computer Use

The computer played no role in Teacher Seven's classroom learning objectives. The reason she allowed children to complete assigned computer activities in her teaching time, was to satisfy the school requirements.

Teacher Seven suggested that the computer did not really fit into how she wanted to teach. A preference was demonstrated for using charts, the blackboard and even a tape recorder rather than the computer as a teaching tool. She saw the computer's role as a consolidation tool not as a subject area to be taught in isolation.

Teacher Seven suggested that using a computer within the classroom was time consuming and needed careful management to ensure children who were using the computer at a particular time, were not missing a more valuable teaching experience with the classroom teacher.

Policy Document Goals

The teacher's place on the continuum is shown in Table 9. Teacher Seven had no documentary evidence of planning for computer use.

Teacher Seven supported her tandem teaching partner's computer programme but the use of the computer in her time was not necessarily related to the educational objectives trying to be achieved.

Teacher Seven lacked confidence in applying existing knowledge to decisions about software selection and use. This teacher only used the computer for report writing to satisfy school requirements.

Table 9: Teacher Seven's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.	X				
1B Degree of Computer Use	B Classroom Practices.	X				
2 Software Appraisal Skills	C Teaching Practices.	X				
3 Use as a Personal Tool	D Personal Practices.		X			

Factors Influencing Computer Use

Teacher Seven suggested if she had additional computer resources she would have found integrating the computer into her classroom programme much easier. "Perhaps if we had more than one computer for use in each classroom, then I would find it easier to use. We need more hardware or we need to have all the computers located in the one room, like it was organised in previous years."

Teacher Seven saw little benefit to her own teaching by using the computer. She did not see the computer as an effective tool as other available technologies and therefore this belief had a limiting influence on her classroom use of the computer. The software applications to subject areas needed to be clearly stated and demonstrated to show the suitability to Teacher Seven's programme. These factors were clearly stated by Teacher Seven during the interview sessions.

"I don't think the computer is as an effective tool as other technologies yet, but in the future it will be. When the software is better suited to what we are doing then it will have more relevance to my teaching."

Teacher Eight

Teacher Eight had taught for ten years and the last five years of her full time teaching career was with the availability of computer resources. Her teaching position was as a support teacher for junior primary classes in the morning, whilst in the afternoon, she taught Teacher Seven's morning class.

Teacher Eight had no formal computer education training in her initial teaching diploma course. She had previously completed a two hour inservice conducted by a software demonstrator from a local computer supplier. This inservice was organised by the school on a professional development day in 1989.

Teacher Eight had no access to a personal computer at home. She did not use the computer for tasks unrelated to her teaching.

Computer Management

Teacher Eight prepared the formal documentation and organised all resources relevant to the class computer education programme. She accepted this role because she felt more confident in this area than her teaching partner, Teacher Seven.

Teacher Eight wrote a formal written programme each term for computer education. Computer access was determined through the class roster. Children's names were placed on a chart with a partner and they were grouped according to their reading ability. A stronger reader was placed with a weaker reader etc. A half hour computer education session was conducted with the whole class each week. The children then rotated with their allotted partner through the software package which had been introduced in a whole class session. The amount of time each pair of children spent on the computer and the type of written follow up activity varied according to the software package being used.

Rationale for Computer Use

Teacher Eight used the computer in her teaching to consolidate learning objectives taught. Computer activities were organised to develop problem solving skills and software packages were chosen to correlate with skills being taught to the children at that particular time.

The main factor contributing to Teacher Eight using the computer as a teaching aid was to satisfy the school requirements.

During an interview session, Teacher Eight stated, "It is a requirement now that the students have to be familiar with the computer and that is why I use it in the classroom."

Teacher Eight suggested that using the computer as a teaching aid did not necessarily improve student's learning. She viewed the computer as a very good motivational tool. Teacher Eight believed if the computer was not used as an instructional tool in the educational programme, then the children in that classroom would be disadvantaged.

Policy Document Goals

The teacher's place on the continuum is shown on Table 10. Documentary evidence displayed that computer education had a separate programme to cover the skills taught by Teacher Eight in this subject.

All computer work was clearly related to educational objectives and the organisation of computer activities varied according to particular applications and teaching used. Teacher Eight made use of simulation packages and support materials available to accompany these packages.

The computer was used as a personal tool for report writing. This application was used to satisfy the school requirements.

Table 10: Teacher Eight's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.			X		
1B Degree of Computer Use	B Classroom Practices.			X		
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.		X			

Factors Influencing Computer Use

Teacher Eight became more familiar with the computer hardware and software packages available for use at the school. Therefore she had greater confidence in using the computer as part of her educational programme.

Teacher Eight was satisfied with both the hardware and software resources available for her classroom use. She acknowledged that a very supportive environment had been created by the administration and the school's computer coordinator to encourage computer use in the class teaching programme.

Teacher Eight's main influence in using the computer in the classroom had been to satisfy the school requirements. Computer implementation into the school's educational programme was a priority for the School's Development Plan during 1988 and 1989.

Teacher Nine

Teacher Nine had taught for four years. The whole time had been with the availability of computer resources. She received extensive training in the area of computer education. Teacher Nine completed two computer education units during her initial Diploma of Teaching course. At her previous school, six professional development inservice courses were attended which were conducted by the school's computer coordinator. A district education officer worked in close liaison with the staff at Teacher Nine's previous school. He helped formulate the school's computer education goals and gave continued support and direction to all staff members at the school.

Teacher Nine purchased her own personal computer to aid in the completion of college assignments while undertaking her teaching diploma.

Teacher Nine demonstrated extensive use of the computer as a personal tool. She used the computer outside of the classroom for school related work and for tasks unrelated to her teaching.

Computer Management

Teacher Nine organised computer education activities in small homogeneous ability groups of two to three children. The children were given a set time to complete a computer activity. Only drill and practice spelling and maths packages were used with the children.

Rationale for Computer Use

The computer played no role in Teacher Nine's classroom learning objectives. It was used as an added incentive for the children and only used as an aid in her classroom teaching because she believed the Ministry of Education required computers to be used in the classroom.

Teacher Nine believed that the lack of quality and overall number of resources influenced the effectiveness of any computer education programme. During a number of interviewing sessions she repeatedly stated,

"The quality of computers supplied to schools is restricted due to finances. Computer education should be given the same amount of resources as any other subject. I equate one computer with one reading book. Everyone gets to use it, but not often enough to learn to read and enjoy it effectively. You wouldn't give a class one reading book and say roster your kids to use the reading book. They say computers are important, well then supply us with the goods or use them realistically."

Policy Document Goals

The teacher's place on the continuum is shown as Table 11. Teacher Nine had documentary evidence of planning for computer use in her daily work pad. She clearly stated that the use of the computer was not related to educational objectives and the computer was used for drill and practice only.

Teacher Nine recognized drill and practice software and its limitations. She made limited use of Computer Assisted Learning packages to achieve educational objectives because of her strong feelings about resource quality, allocation and physical arrangements of the hardware.

Teacher Nine made extensive use of her personal computer as a tool. She used the computer for numerous daily tasks and for a variety of applications.

Table 11: Teacher Nine's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.		X			
1B Degree of Computer Use	B Classroom Practices.	X				
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.					X

Factors Influencing Computer Use

Teacher Nine used computers in her classroom teaching to satisfy ministerial requirements. She considered the computer as a useful teaching tool that could extend the brighter children, remediate the weaker children and provide valuable hands on experience for the main stream. However, software packages available did not necessarily suit her teaching style.

Teacher Nine had previously taught at a school where the computers were set up in a laboratory and she found this to be a far more beneficial computer education teaching structure. Therefore, having one computer in the classroom restricted her use.

Time was a major factor influencing this teacher's computer education programme. Teacher Nine stated, "You already lose a lot of time at this school by having Lesson Enrichment Time (LET) time in the morning during skills time and I am not prepared to lose any more skills time by putting children on computers."

The organisation of computer resources at the school had a major influence on the type of computer education programme adopted by Teacher Nine. She preferred that the computer hardware resources to be placed in a laboratory rather than as a stand alone in each classroom.

Teacher Nine stated that the quality of software, insufficient time to preview available software and the lack of appropriate software packages to integrate into the current syllabi affected the type of computer education conducted in her class.

Teacher Ten

Teacher Ten had eight years teaching experience. The last four years had been with the availability of computer resources. She was tandem teaching with Teacher Eleven. Teacher Ten taught for 0.6 of the total teaching and Teacher Eleven taught for the remaining 0.4 time.

Teacher Ten began using the computer when she was committed to its use by the school policy of a previous school. She had only completed a small number of courses which were conducted by the computer co-ordinator at her previous school. These courses were a basic introduction to using the computer in the classroom. They covered the hardware aspect of using computers and how to integrate them into other subject areas. Teacher Ten received no other district or ministerial support. Teacher Ten did not have access to a Personal Computer.

Computer Management

Teacher Ten and Eleven did not use the computer as part of their teaching programme in Term 1. The log book account of computer use indicated that the computer was not used at any stage by the children or teachers in Term One.

The interview with these teachers revealed that the reason for no computer education in Term One was the result of

using the first four to six weeks of the term acquainting themselves with the students as they believed the class was too unruly to cope with computer use. After this time period, they anticipated setting up a computer education programme, however a new student arrived whose behaviour was worse than other class members and created massive disruptions to the classroom working tone. Teacher Ten stated, "The new boy disrupted everything for weeks. The main reason for not using the computer was because we felt that we couldn't cope with more disruption of children getting up and down. The new boy was disrupting everything all the time."

The interview revealed that the role the computer played in this classroom had changed in term two. It was used to support the behavioural and educational programme. The access to the computer in term two was organised on a rotational basis, with the children rotating in partners whilst working through the software packages. The children were placed in pairs according to their normal classroom sitting position. The computer was used in the morning for drill and practice software packages and the children worked on the package for a thirty minute session. In the afternoon, the computer was used as a part of the classroom reward system. The children received tokens for good work and good behaviour. Once a certain amount of tokens were accumulated, the child received an hour on the computer as

their reward. This afternoon session only operated for two days of the week. The children had a free choice of software simulation packages during the reward session.

Formal documentation of the computer programme included the software package title being written into the appropriate subject programme for term two. A policy statement for computer education was also included in both Teacher Ten and Eleven's programme file. The computer activities were not integrated into the class programmes and no written activities were completed by the children in relation to their computer work. There was no set work associated with the computer activity and it was organised into a thirty minute time period. The morning computer education work was used to reinforce Teacher Ten's programme and as a chance for the children to practise some of the skills taught.

Rationale for Computer Use

Teacher Ten used the computer to reinforce her own teaching as she believed she had insufficient knowledge about using the computer in any other way. The second reason Teacher Ten used the computer was for student motivation and as part of her reward system. She believed it was important for children to become confident in using the computer as it would be a necessary skill for the children in later life. Teacher Ten believed the computer has a positive impact on

student motivation. She believed the computer could be a useful teacher aid however there was a need for a great deal of time to effectively use the packages as the teacher was the organiser, the reader and the facilitator of any computer education programme.

Policy Document Goals

The teacher's place on the continuum is shown as Table 12. Teacher Ten's log book results indicated that she would have achieved Phase 1 for goals one and two during the first term. The information obtained during the interview and documentary evidence indicated the results of the teacher profile attainment of computer policy goals. Table 12 displayed goal achievement for term two.

Planning for computer education only began in term two and it involved recording the software package title in the relevant subject programme. Computer applications used in term two were drill and practice and simulation packages for the afternoon session.

Teacher Ten's personal use of the computer was only for report writing as the administration encouraged the use of the report writing software package. This approach added continuity to school reporting.

Table 12: Teacher Ten's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.		X			
1B Degree of Computer Use	B Classroom Practices.		X			
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.			X		

Factors Influencing Computer Use

The log book results indicated that certain classroom factors needed to be satisfied prior to Teacher Ten implementing any type of computer education programme. Teacher Ten used the first six weeks of the term to get to know the students and establish class rules and discipline. The computer was seen as a factor which could disrupt normal classroom operations and undermine class rules being established. This was further highlighted by the situation of a new child coming to the class who didn't have acceptable behaviour, thus the computer education programme was postponed until the beginning of Term 2.

The computer was used in the afternoon sessions as part of the class reward system. Teacher Ten used the computer in

this role because all the children chose to have free use of the computer as their highest reward. She perceived the computer as a very effective motivational tool. Teacher Ten's computer use was affected by her lack of knowledge in this area. She clearly stated that she would like further inservicing and training. She would have like to have greater skills so that she could integrate computer programmes into the total curriculum and be shown ways in which the computer could be effectively used to assist in record keeping, programming and other tedious administrative tasks.

Teacher Ten did not have sufficient time to review software packages and integrate them into the total curriculum. She believed it was the education minister's role to provide a handbook and sample programmes which showed direct integration of the software package.

Teacher Eleven

Teacher Eleven had twelve years teaching experience and the last four years of her teaching career was with the availability of computer resources. Teacher Eleven's previous school had six BBC microcomputers for twelve classes and they were used on a rotational basis. At this

previous school the computer coordinator provided inservicing to staff members on the basic operational skills needed to use the computer. Teacher Eleven also completed a two hour word processing workshop session at a local computer supplier centre. At the previous school, Teacher Eleven organised computer work into a specific exercise book and the children had specific tasks to complete whilst using the computer.

Teacher Eleven did not have a personal computer at home and did not take the school computer home. A reason for not taking a school computer home was that she would not be able to return it for five days due to her non contact time with the class.

Computer Management

The computer management was the same as Teacher Ten. Both Teacher Ten and Eleven discussed their computer policy at the beginning of each term. Teacher Eleven only allowed a one hour session in the afternoon to be used as part of the reward programme. The children who achieved sufficient reward tokens, were able to use the computer during the Art and Craft time slot in Teacher Eleven's two days of teaching each week.

The computer education programme in the morning session would be cancelled if there were any incursions or excursions taking place that week. Teacher Eleven stated, "You can wave goodbye to using the computer when any interruptions happen. One of the first things to go would be computer time." Teacher Eleven also stated that once all the children had used the assigned drill and practice software package in the morning session, the computer was only used for the reward system in the afternoon.

Rationale for Computer Use

Teacher Eleven reiterated on the points made by Teacher Ten. A computer education programme was not initiated in term one because of the large class size of thirty four children and the number of children who needed to improve their classroom behaviour. Once these problem were overcome, the computer programme was started in term two.

Teacher Eleven only used the computer as part of her classroom teaching if it was related to what she wants to teach, otherwise the computer was only used as a reward. Teacher Eleven stated that she would have used the computer more in her teaching but she did not like the disruption it caused.

Teacher Eleven stated, "The computer is a disruption to my teaching most of the time because you say two children can go on the computer and the next thing, there are ten all around it."

Policy Document Goals

The teacher's place on the continuum is shown as Table 13.

Teacher Eleven's log book results indicated that she would have achieved Phase 1 for goals one and two during the first term. The information obtained during the interview and documentary evidence indicated the results of the teacher profile attainment of computer policy goals. Table 13 displayed goal achievement for term two.

Teacher Ten and Teacher Eleven completed all subject programmes together. Formal planning for computer education only began in term two. The software package title was recorded in the relevant subject programme.

Computer applications used in term two were simulation packages for the afternoon session as part of the classroom reward system.

Teacher Eleven's personal use of the computer was only for report writing. The school administration encouraged its use as they believed it added continuity to school reporting.

Table 13: Teacher Eleven's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.		X			
1B Degree of Computer Use	B Classroom Practices.		X			
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.			X		

Factors Influencing Computer Use

Teacher Eleven did not use the computer more extensively because of the time factor. She suggested that there were many other subject areas that needed to be taught and computer education had one of the lowest priorities. Teacher Eleven suggested the tandem teaching arrangement could affect how smoothly the computer education program ran. Often the timetable was interrupted and children were denied use of the computer and it was not possible to check with the other teacher to see if the children had their allotted computer time.

Teacher Eleven only used the software packages that she was familiar with and therefore restricted the type of software used on the computer. Teacher Eleven's use of the computer as part of her reward system was based on the belief that it had an impact on student motivation and behaviour. Teacher Eleven also made reference to the size of the classroom restricting the type of computer program conducted. The number and position of power points affected where the computer could be placed in the classroom. She also suggested that there was not a satisfactory withdrawal area for computer education to take place.

Teacher Twelve

Teacher Twelve taught for two years full time and for two years as a relief teacher. The last eight months had been at her present school where there were computer resources available for each individual classroom. Teacher Twelve had not completed any computer education courses.

Teacher Twelve had access to a computer outside of the school environment. This computer was an IBM compatible personal computer which she used for tasks related and unrelated to school.

Computer Management

The whole class was organized into computer groups. These groups were rotated through each session and each group was ticked off on the completion of their allotted time. The children in Teacher Twelve's class chose groups of three and these groups were then written on a class chart. From 9.00 am to recess, the children worked on a language package. From recess to lunch, the children completed a maths package. After lunch, the computer was used for either a Social Studies, Science or Health simulation package. Teacher Twelve used the computer for drill and practice and computer assisted instruction. The children also completed a small amount of word processing. A parent took home the children's draft copies of their written expression and typed them out on her own word processor. The children were then given the hard copy. Teacher Twelve had no formal documentation about a computer education program conducted in her class. Software packages were randomly chosen from the titles available and were viewed while in use by the children.

Rationale for Computer Use

Teacher Twelve used the computer in her teaching because of the availability of hardware resources in the classroom. She believed that computers were beneficial to the children's

learning because they enjoyed using them and it developed group cooperation skills.

Policy Document Goals

The teacher's place on the continuum is shown as Table 14. Teacher Twelve had no documentary evidence of planning for computer use in her programmes and daily workpad. She had established a classroom computer roster and left the appropriate software package to be used by the children next to the computer.

Classroom practices indicated computers were used for drill and practice, computer assisted learning and word processing. Most computer use was clearly related to educational objectives. Teacher Twelve recognized drill and practice software packages but did not evaluate new software based on educational objectives.

Teacher Twelve used the computer as a personal tool for numerous tasks. She used both the school computer and her home computer for many word processing applications. i.e. parent letters, student activity sheets, class lists, report writing and personal budgeting.

Table 14: Teacher Twelve's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.	X				
1B Degree of Computer Use	B Classroom Practices.			X		
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.					X

Factors Influencing Computer Use

The availability of resources in the classroom setting influenced Teacher Twelve's classroom use. She used the computer to reinforce concepts being taught in specific subject areas. Time restrictions restrained Teacher Twelve's computer use. She believed teaching had become too diverse and decisions had to be made about what skills needed to be taught. New curricula and materials were constantly being introduced without training being given to develop teaching skills and ways in which to implement these materials. Teacher Twelve received no formal training or inservicing and this influenced the type of computer education programme conducted in her classroom. She was not familiar with

available software packages and was not aware of the various applications the computer could be used for.

Teacher Thirteen

Teacher Thirteen had twelve years teaching experience and the last four years of her teaching career were with the availability of computer resources.

Teacher Thirteen had completed her Bachelor of Education with a major in Computer Education. She completed four units in the area of computer education. Teacher Thirteen completed her Bachelor of Education in 1989. During the last four years of her study she had access to computer resources at school. Computer education was chosen because of Teacher Thirteen's belief that it would open up new avenues in both her teaching career and enable her to qualify for alternative employment. She completed an inservice conducted by a local software demonstrator. This inservice was concerned with computer timetabling and integrating software packages into the total teaching programme. Teacher Thirteen attended a district network meeting in 1989 about computer use in the primary grades. She had access to computers at a Western Australian College of Advanced Education whilst

completing her study. Teacher Thirteen often took home a school computer.

Computer Management

The whole class participated in the computer education programme. The children were organized with a partner into groups of two. The children worked from the classroom timetable and completed the designated software package in accordance with the timetable.

From 8.50 am to 10.30 am maths activities were performed. During the time 10.45 am to 12.00 pm, language and spelling activities were performed. 1.00 pm to 2.00 pm was concerned with problem solving activities and from 2.05 pm to 3.00 pm story writing was performed. The children were grouped by the teacher according to their ability levels. A weaker achiever was placed with a more capable student. The only written work produced at this stage was a class story produced on a word processing package. Class monitors had been established to set up the computer during the day. These monitors were changed weekly.

Rationale for Computer Use

Teacher Thirteen used the computers as a teaching aid. She perceived the use of the computer in the classroom as a method for allowing students to become competent and

familiar with technology. Teacher Thirteen used the computer as part of her teaching programme to extend their knowledge about the computer. She also used the computer to develop and reinforce skills taught in various subject areas. Teacher Thirteen viewed the computer in the classroom as another teaching aid. She considered it as a tool for learning and therefore it was integrated into the other subjects. She believed that computer education was an integrated subject at the primary school level.

Policy Document Goals

The teacher's place on the continuum is shown as Table 15. Teacher Thirteen had a limited amount of documentary evidence to indicate the extensiveness of her use in the classroom. She only had a roster of children's computer groups and the names of the software package to be completed at the particular time slot during the day. Her classroom practices indicated that computer use was a part of classroom learning activities.

Table 15: Teacher Thirteen's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.		X			
1B Degree of Computer Use	B Classroom Practices.			X		
2 Software Appraisal Skills	C Teaching Practices.				X	
3 Use as a Personal Tool	D Personal Practices.					X

Factors Influencing Computer Use

Teacher Thirteen had extensive training in the area of computer education, having completed her Bachelor Education in this area. She was confident about the role it played in the classroom learning objectives and was familiar with the available software. Teacher Thirteen mentioned a desire to have more software packages made available in the school and multiple copies created so more than one class could use a particular package at the one time. She believed software resources need to be increased continually. Teacher Thirteen believed the computer was a good motivational tool and could therefore increase pupils' mastery of materials.

Teacher Thirteen was able to define a good software package and suggest ways in which it could be used across the curriculum to achieve its educational objectives.

She made extensive use of the school's computer for personal use such as the production of letters, reports, flyers and handouts.

Teacher Fourteen

Teacher Fourteen had been teaching for nine years, the last five years had been with the availability of computer resources. He had completed a workshop on the word processing application (Edword). Teacher Fourteen also worked closely with the school computer coordinator to evaluate new software packages, and packages with which he was unfamiliar. Teacher Fourteen began using the computer when the resources were first purchased by the school. He suggested that a large amount of his computer knowledge was gained through trial and error and watching the children operate the computer. Teacher Fourteen did not have his own personal computer however he regularly took home the school computer to complete tasks both related and unrelated to his teaching. Teacher Fourteen used the computer quite extensively as a personal tool.

Computer Management

A class roster was organised with the children divided into partner groupings. These groupings rotated until all the children completed the specified software package. During term one, the children were given cards which allowed them access to the computer at lunch time. Legal issues about the children working in the classroom unattended meant that Teacher Fourteen had to halt the lunch time computer use at the end of term one. All of Teacher Fourteen's class used the computer, however it was not evenly divided. Teacher Fourteen had introduced the word processing package, Edword to his students. Once the children had written drafted stories, they typed their stories into the computer and printed out a hard copy. The final copy of the story was then assessed by the teacher. A limited number of simulation and drill and practice packages had been used by the children in the class. The main computer application was word processing. Teacher Fourteen annually allowed his children to complete a project on computers. He believed this increased the awareness and knowledge of computers.

Rationale for Computer Use

Teacher Fourteen suggested the role the computer played in his classroom learning objectives was to reinforce skills and provide a different teaching technique.

He stated, "The role of the computer plays in the curriculum is reinforcement of skills, stimulator and motivator." Teacher Fourteen used the computer as part of his teaching programme for a variety of reasons. He believed the computer was an excellent motivational tool which the children enjoyed using because of the explicit graphics contained in some packages. The computer was used to reinforce concepts taught in class and as an alternative strategy to aid presentation.

A word processing package was used to improve writing skills and consequently while the children were using the computer to develop other skills, they would develop computer awareness. Teacher Fourteen strongly believed that computer education should be a subject in its own right and have a specialist teacher. He did not use the computer in this capacity due to the limitations of time and human resources. He saw skill development using a word processing package as being the most benefit to the students.

Policy Document Goals

The teacher's place on the continuum is shown as Table 16. Teacher Fourteen had no formal documentation about his computer education programme and computer use was related to educational objectives. He made limited use of computer assisted learning packages to achieve educational

objectives. Time restraints meant he was unable to trial new software packages and propose other educational objectives. Teacher Fourteen's personal use of the computer was for word processing, classroom programmes and report writing.

Table 16: Teacher Fourteen's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.	X				
1B Degree of Computer Use	B Classroom Practices.			X		
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.					X

Factors Influencing Computer Use

Limited training in this area influenced the type of computer programme operated by Teacher Fourteen. He suggested, "I don't have an awful lot of knowledge about the computer in the classroom. I just find it difficult to put the theory into practice." Teacher Fourteen would have liked a greater number of inservice courses on software programmes and the skills developed in each programme. Teacher Fourteen's computer use was also limited by the wide range

of children's abilities and their lack of independent work habits. He perceived a demand to emphasise the basic skills and basic subject areas because of the poor skills demonstrated by the majority of the students in his class. Teacher Fourteen did not envisage that a computer education programme could achieve these goals and it would take valuable time away from the skill development area in literacy and numeracy.

The place of installation of the two power points determined where the computer was to be situated and this positioning could have been a distraction to other children. Teacher Fourteen preferred the computer resources to be placed in one central location. He believed this would ensure a more balanced computer education programme for all students.

Teacher Fifteen

Teacher Fifteen had eleven years teaching experience, the last five years had been with the access to computer resources. She completed a technical college introduction to BASIC programming course. The deputy principal of her previous school conducted an introduction to computer use inservice which Teacher Fifteen attended. She did not have access to a personal computer outside of school. At her

previous school, Teacher Fifteen had parent helpers to assist with the children's word processing activities. The parents helped individual children type in their creative writing stories with the Edword word processing package. Teacher Fifteen did not continue this type of computer use at this school as the parents did not offer their assistance in this area.

Computer Management

Computer use in Teacher Fifteen's class was organised into a formal one hour session and was sometimes supplemented by other impromptu computer times. The children were randomly assigned into a computer group of four children consisting of two boys and two girls. Once a week, parent helpers came into assist with this activity session. Two groups of children worked on a computer software programme at two different computers. A parent helper was assigned to each group and a follow up activity was given to the parent to be administered to the children after they have completed the package. The children completed simulation and vocabulary extension packages. The software packages were previewed prior to the lesson and follow up activities and worksheets were organised to accompany the computer work. Teacher Fifteen wrote the software package title and activity into her daily workpad.

Rationale for Computer Use

Teacher Fifteen used the computer as part of her teaching programme as she believed computers would be a large part of the child's world in the future. School requirements also had some influence on her computer use. The computer was used to reinforce learning objectives being taught. Teacher Fifteen saw the computer as a tool for teaching, not as a separate subject area taught in isolation.

Policy Document Goals

The teacher's place on the continuum is shown as Table 17. Classroom practices clearly indicated that all computer use was related to educational objectives and an extended range of computer assisted learning packages were used as part of the computer programme. Teacher Fifteen appraised software packages and was able to propose educational uses. Support materials were developed to supplement the software package being used.

Teacher Fifteen used the computer as a personal tool for report writing. She also used the word processing package to write subject policy overviews.

Table 17: Teacher Fifteen's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.		X			
1B Degree of Computer Use	B Classroom Practices.			X		
2 Software Appraisal Skills	C Teaching Practices.			X		
3 Use as a Personal Tool	D Personal Practices.			X		

Factors Influencing Computer Use

Teacher Fifteen felt confident with the operational procedures of the computer and had a sound knowledge of the school software. She believed the school needed to purchase a greater amount of software packages as there was a limited number available for her particular year level. With more human resources, Teacher Fifteen suggested she would be better able to utilize the computer as a teaching aid. Teacher Fifteen believed the computer had a high motivational influence on the children's work habits. It was often used as an incentive to complete assigned tasks neatly and accurately. Physical restrictions imposed in the classroom setting hindered Teacher Fifteen's computer use.

The power points determined the positioning of the computer. Teacher Fifteen made the recommendation that the ministry should provide a greater number of support materials and practical programming ideas on how to integrate the computer into the total learning programme.

Teacher Sixteen

Teacher Sixteen had nine years teaching experience. Her first contact with computers occurred when she participated in a teacher exchange programme to Canada. The Canadian school had an Apple MacIntosh machine in each classroom. At the Canadian school, numerous professional development days were attended by Teacher Sixteen. These development days included introductory computer courses to increase familiarisation and confidence with the software packages.

Teacher Sixteen returned to her previous Western Australian school after her one year of exchange teaching. This school had a full time computer specialist teacher. The specialist teacher taught the children for an hour session once a week. The information taught in each session was passed on to the teacher through the children in her own computer session. Teacher Sixteen taught at the school with the full time

computer specialist until she was transferred to her present school.

No formal computer education courses had been completed by Teacher Sixteen. She did not have access to a personal computer.

Computer Management.

Limited computer use was shown over term 1. The total computer usage time was two hours. Teacher Sixteen attributed this result to the tandem teaching position. Both teachers had not taught together as a tandem partnership prior to this position. Teacher Seventeen and Teacher Sixteen's main objectives for term one were to introduce and establish the class rules and establish the academic levels of the children. These objectives were to be achieved prior to implementing a class computer education programme.

The whole class completed a software package before a new software package was introduced. The types of software applications used by the children in term one and term two were mostly drill and practice and a word processing package, Edword. The latter package was only introduced to some children.

The only formal documentation concerned with the computer education programme was a maths software package title which was recorded in the teacher's written maths programme.

Rationale for Computer Use

The computer in Teacher Sixteen's class was used as an extension of the teacher's learning objectives. Teacher Sixteen was very supportive of computer use as part of the educational programme. She stated "Personally, I think the kids have got to have contact with computers because it is the way the world is and the more the better. In fact I feel like I really can't do enough with them."

Teacher Sixteen's previous classroom computer experiences had been with the support of a full time computer specialist teacher. She found that time restraints limited the type of computer activities undertaken. Time to review available software resources and contact time with students limited the time spent on Teacher Sixteen's computer programme.

Teacher Sixteen believed that the computer had an impact on student motivation and used it as part of the class reward system. She believed that more computer hardware resources would have complemented the type of computer education programme she would have liked to undertake in the class. Ideally, Teacher Sixteen suggested that the computer should

be used for extension and remediation, closely linked with the present curriculum.

Policy Document Goals

The teacher's place on the continuum is shown as Table 18. This profile had been established combining the results of term one and term two computer usage. Log book data collected in term 1 strongly indicated that Teacher Sixteen had limited computer use (Phase 1), in achieving both goal 1 and 2. Use of the computer as a personal tool remained the same for all classroom practices observed. Teacher Sixteen made limited use of the word processing application and used the computer for school report writing and .

Teacher Sixteen's profile on computer goal achievement indicated that she was in the transition stage between limited and moderate computer use in the areas of classroom practices, documentary evidence of planning and software appraisal.

A limited amount of use was made of the word processing package Edword. Term two classroom practices indicated drill and practice activities for maths, spelling and punctuation. The only documentary evidence shown was a software package listing in the maths subject area.

Table 18: Teacher Sixteen's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.		X			
1B Degree of Computer Use	B Classroom Practices.		X			
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.			X		

Factors Influencing Computer Use

The creation of a new teaching partnership, a new school and a new unfamiliar year level of students all contributed to the computer programme undertaken by Teacher Sixteen. Teacher Sixteen and Teacher Seventeen's main teaching objectives in term one were to establish the necessary class rules and to assess the children's academic abilities. These two criteria needed to be satisfied prior to a computer education programme being formally conducted by Teacher Sixteen.

Teacher Sixteen made reference to the lack of time to view suitable software packages for the year level which had been

taught. She believed a full time computer specialist teacher was needed to formally plan for computer education. This computer teacher could teach the necessary skills which could then be reinforced by the class teacher.

Teacher Seventeen

Teacher Seventeen had been teaching for five years. This year was the first year she had the opportunity to teach with the availability of computer resources.

Teacher Seventeen completed two electives at college which involved computer familiarisation. A maths elective involved some practical computer activities and the other unit completed was an introduction to computer education.

Teacher Seventeen had received no school inservicing and had not attended any professional development courses related to computer education. She had an IBM compatible computer at home which was used extensively for both tasks related and unrelated to her teaching. The personal home computer was used for any correspondence and to produce a monthly flyer for a community club. Teacher Seventeen used her own personal computer for borders and illustrations on student

worksheets, programme subject policies, letters, tests, class lists and student activity sheets.

Computer Management

The computer log book, kept over eight weeks of the first term, showed limited use of the computer by the students. The total computer usage time was two hours.

Teacher Seventeen stated that her limited computer teaching experience, reduced her ability to successfully implement a computer programme. The school software resources were unfamiliar to Teacher Seventeen and she had no prior knowledge of the formats needed for establishing and organising computer groups. Both tandem teachers were unsure of a system to establish a computer education program in their class for this year level.

The only formal documentation of the computer education programme was a maths software package title which was recorded in the teacher's written maths programme.

Rationale for Computer Use

The computer education programme in Teacher Seventeen's class did not play a role in the teacher's learning objectives.

Teacher Seventeen stated, "The computer does not affect my classroom teaching at all." She saw the computer as just another optional teaching aid which made no difference to her own teaching. Teacher Seventeen maintained that a computer education programme had no effect on how well students learned a concept. She was unsure about the role the computer played in the curriculum. Teacher Seventeen believed it must be included in the class programme but to what degree and in what subject areas, she was not certain. Children were given the opportunity to use the computer in her class, as it was Teacher Seventeen's opinion that the children needed to know how to use the computer in their future careers.

Policy Document Goals

The teacher's place on the continuum is shown as Table 19. This profile was established by combining the results of term one and term two computer usage. Term one's log book data strongly indicated that Teacher Seventeen had limited computer use (Phase 1), in achieving both goal 1 and 2. Goal 3 results remained the same for all classroom practices observed.

Teacher Seventeen's profile on computer goal achievement indicated that she was in the transition stage between limited and moderate computer use in the areas of classroom

practices, documentary evidence of planning and software appraisal.

Teacher Seventeen made extensive use of the computer using it as a personal tool. It must be noted that these activities were not completed on the school's BBC microcomputer but on the teacher's own IBM compatible personal computer.

Table 19: Teacher Seventeen's Attainment of Computer Policy Goals.

GOALS.	OUTCOME INDICATORS	PHASES				
		1	2	3	4	5
1A Planning for Computer Use	A Documentary Evidence.		X			
1B Degree of Computer Use	B Classroom Practices.		X			
2 Software Appraisal Skills	C Teaching Practices.		X			
3 Use as a Personal Tool	D Personal Practices.					X

Factors Influencing Computer Use

Teacher Seventeen's computer use in term one was influenced by factors resulting from the creation of a new tandem teaching partnership. Teacher Seventeen and Teacher

Sixteen's main teaching objectives in term one were to establish the necessary class rules and to assess the children's academic abilities. These two criteria needed to be satisfied prior to a computer education programme being formally conducted by Teacher Seventeen.

Limited knowledge about the BBC computer and the software available at the school also influenced the type of computer education programme conducted in term two by Teacher Seventeen. She had no prior knowledge about how to operate a BBC microcomputer and was unfamiliar with all the software which could be used on these machines.

Teacher Seventeen made reference to a desire to view other teacher's computer education programmes in operation, to increase her knowledge about alternative management procedures and to successfully utilise one computer into the daily teaching programme.

CHAPTER 5

Data Analysis

This study examined individual teacher's attainment of computer goals in relation to the Western Australian Ministry of Education Computer Education Policy Document. It also addressed the factors which have attributed to these results.

The overall school profile of computer goal attainment, highlighted a number of key factors which influenced the utilization of technology by the school staff.

School Profile on Goal Achievement

The log book information, teacher interviews and analysis of teacher documentation formed the basis of the data analysis. A collation of individual teacher profiles was compiled to indicate the following patterns in computer education across the school.

Attainment of Goal 1A

This goal measured the extent to which documentary evidence displayed computer use as an integral part of classroom learning practices. Table 20 revealed that 35 % of teachers at this school were in Phase 1. They displayed limited

computer use in their formal documentation. This was shown by the lack of documentation for computer education in their programmes and daily workpad. The majority of teachers (47%) were in the lower transitional phase of computer use, the transition between limited computer use and moderate computer use. Documentary evidence of planning for computer use was evident in the teachers' daily work pad or by software package titles being listed in the appropriate subject programme. This indicated that the teachers were achieving poorly on The Policy Document indicators and that they were not incorporating the regular use of the computer into their own teaching / learning environment.

The computer education programme was given a low priority by many teachers as the computer was considered to have limited role in the achievement of learning objectives. A small number of teachers (18 %) were in Phase 3, indicating moderate computer use. Their documentary evidence indicated regular use of the computer in their own teaching / learning environment to achieve particular objectives. The principal did not have a formal school policy on documentation in the area of computer education. The new ministerial regulation on subject programming stated that teacher programmes need not be submitted to the school administrators and this may have had an influence on the lack of teachers' formal documentation in the area of computer education.

Most teachers had very little or no documentary evidence to justify the type of computer programme in operation. There were no teachers achieving at the extensive implementation phase (Phase 5) despite the intention of the Western Australian Ministry of Education for teachers to be aspiring to achieve this phase.

Table 20 illustrates the extent to which documentary evidence indicates computer use as an integral part of classroom learning practices. (Goal 1A)

Table 20: Staff Achievement Goal 1A.

PHASES.	DESCRIPTION.	NO. OF TEACHERS.	% OF TEACHERS.
Phase 1	Limited Computer Use	6	35%
Phase 2	Lower Transition	8	47%
Phase 3	Moderate Computer Use	3	18%
Phase 4	Higher Transition	0	0%
Phase 5	Extensive Computer Use	0	0%

Attainment of Goal 1B

The results obtained through log book entries and teacher interviews indicated the extent to which computers played an integral part of classroom learning practices. Illustrated

in Table 21, three teachers (18%) showed little or no classroom use of computers nor did their computer use relate to educational objectives. These teachers saw no value in using the computer to support their educational programme.

Table 21 illustrates the extent to which classroom practice indicates computer use as an integral part of classroom learning practices. (Goal 1B)

Table 21: Staff Achievement Goal 1B

PHASES.	DESCRIPTION.	NO. OF TEACHERS.	% OF TEACHERS.
Phase 1	Limited Computer Use	3	18%
Phase 2	Lower Transition	6	35%
Phase 3	Moderate Computer Use	7	41%
Phase 4	Higher Transition	1	6%
Phase 5	Extensive Computer Use	0	0%

Table 22 shows that all teachers whose classroom practices involved limited use of the computer in the classroom, were either new staff members or were participating in a tandem teaching partnership. The tandem teachers in this category viewed the computer as having a limited role in their classroom objectives and their tandem teaching partner took responsibility for the computer programme. They viewed the

computer with scepticism and expressed genuine concerns about their inadequacy in this area. New staff members had higher priorities with establishing classroom management strategies in the beginning stages of the year. Therefore, both new teaching staff and tandem teachers' computer education programme took a very low priority.

Table 22: Staff Members with Limited Classroom Computer Use

Total Teaching Staff.	New Staff	Old Staff
5	3	2
	Tandem Teacher	Non - tandem Teacher
5	4	1

The majority of the school staff were in Phase 2 and 3 displaying the extent to which classroom practice indicated the computer use as an integral part of classroom learning practices. Close to one third of teachers (35%) were in the transition between the limited and moderate computer use and most teachers (41%) were in the moderate computer use phase.

These findings illustrated in Table 21, indicated that the computers were used for drill and practice and computer assisted learning activities. The computer use by these teachers was clearly related to achieving educational objectives.

Log book results collected in term one, clearly indicated a high relationship between the teachers' computer use and being a new staff member. New staff members displayed a lower achievement in implementing The Policy Document goals. Teacher Log Book data enteries have been illustrated in Table 23.

Illustrated in Table 23, 71% of new staff members had no log book entries for term one, which showed no computer use or programme for that term. These results demonstrated that teachers did not see the use of computers as an integral part of teaching but something to be used as an extra activity. Teachers placed a higher priority on classroom management and familiarisation with the students' abilities and work habits. The new staff members also placed great importance on the understanding of school procedures, school policies and their operation. These factors had a higher priority than the implementation of a computer education programme and needed to be adequately met before the new staff members began any classroom computer education programme. The remaining two new teachers, who did begin a computer education programme in term one, were Teacher Two, the deputy principal, and Teacher Nine. Teacher Two, due to his position, may not have had the same concerns as other classroom teachers. The deputy principal had non-contact time in the afternoon to familiarise himself with the school policies. Teacher Nine, the other new staff member who

undertook some type of computer education programme in term one, had extensive initial computer education training while completing her undergraduate Diploma of Teaching. This was a criterion not common to any other new staff members. 84% of the original staff had log book data entries relating to their computer education programme in term one. This suggested that they believed the computer did play a role in their classroom learning programme. These teachers were also present at the school when the implementation of a computer education programme was a priority for the school development plan in 1989. Teachers at the school were part of the decision making process, making this area a school priority and therefore they may have felt obligated to continue to support and implement this programme.

The two original staff members who did not have any computer log book entries and therefore did not have any type of computer use in their class programme, were both tandem teaching partners. They both relinquished responsibility for the planning and implementation of the computer education programme throughout the year. Their other teaching partner formally planned and implemented a computer education programme in their own teaching time. These teachers felt inadequacies in their knowledge of computer education and their methods of application in the classroom setting.

Table 23: Log Book Data (Computer Use Term 1)

Log Book Entries.		
New Teaching Staff	No. of Teachers	Percentage of Teachers
No Log Book Entries	5	71%
Log Book Entries	2	29%
Old Teaching Staff	No. of Teachers	Percentage of Teachers
No Log Book Entries	2	20%
Log Book Entries	8	80%

Results showed a similar pattern emerging for the attainment of Goal 1A and Goal 1B. Over 50 % of the teaching staff achieved in the lower phases, one and two. This indicated that overall, the teaching staff at this school were in the lower phases of implementing The Policy Document into their class programme. Most teachers at the school were achieving in the lower phases of implementation for using the computer as an integral part of classroom learning practices.

Attainment of Goal 2C

Table 24 clearly displays that the majority of staff, 64%, were in phase 2 of achieving this computer goal. This implied that these teachers made limited use of computer

assisted learning packages to achieve educational objectives.

Table 24 illustrates that teachers were achieving in the lower phases of software appraisal. The lack of staff training in this area would have greatly influenced this result. Teachers did not have the knowledge and expertise to successfully appraise software resources for use.

Table 24 shows the extent to which teachers are confident in appraising software to meet their own teaching purposes. (Goal 2C)

Table 24: Staff Achievement Goal 2C

PHASES.	DESCRIPTION.	NO. OF TEACHERS.	% OF TEACHERS.
Phase 1	Limited Computer Use	2	12%
Phase 2	Lower Transition	11	64%
Phase 3	Moderate Computer Use	2	12%
Phase 4	Higher Transition	2	12%
Phase 5	Extensive Computer Use	0	0%

Results showed that the teachers who were achieving well in this goal were staff members who had extensive computer

knowledge and training. The skills needed to confidently review and select software to support educational objectives was closely related to the teacher's knowledge and training in the area.

Table 25 illustrated that additional teacher training related directly to extended implementation of The Policy Document. The teachers' who had received limited teacher training were achieving in the lower phases of implementation. Therefore these results suggest that inservicing is a necessary component to increase teachers' confidence and software appraisal skills.

Table 25: Relationship between Computer Training and Achievement of Goal 2C.

Teacher Training	Number of Teachers in Each Phase				
	Phases				
	1	2	3	4	5
Limited	12%	52%	6%		
Moderate		12%	6%		
Extensive				12%	

Attainment of Goal 3D

The third goal was in the higher stages of achievement which displayed that the teaching staff were making use of the computer as a personal tool. Teachers were using the computer for their administrative tasks, however goals pertaining to classroom practices displayed a limited adoption of The Policy Document. This may have been the result of the school administration clearly supporting the use of the computer in these areas and teachers gaining confidence in using the computer for tasks unrelated to classroom practices.

Overall the teaching staff at this school was achieving moderate to high in using the computer as a personal tool. Only one staff member made no progress in this area. Over half of the staff members (59%) were using the computer in some form as a personal tool. A large percentage, 35% of teachers, were using the computer for numerous daily tasks as shown in Table 26.

Table 26 illustrates the extent to which teachers use a computer as a personal tool. (Goal 3D)

Table 26: Staff Achievement Goal 3D

PHASES.	DESCRIPTION.	NO. OF TEACHERS.	% OF TEACHERS.
Phase 1	Limited Computer Use	1	6%
Phase 2	Lower Transition	4	24%
Phase 3	Moderate Computer Use	6	35%
Phase 4	Higher Transition	0	0%
Phase 5	Extensive Computer Use	6	35%

These results suggested that the teaching staff felt more confident about using the computer for their own administrative tasks, however the same confidence was not evident in the staff's practices with the pupils.

During semester one, the whole staff had used the computer for their report writing. The administration fully supported computer report writing. It encouraged continuity of written reports throughout the school and therefore support was given to teaching staff to successfully implement the reporting software package. The school computer coordinator organised disks for individual teachers and hardware resources were centrally located to ensure ease of access. The school secretary was allotted time by the principal to type general comments on computer reports and make duplicate

photocopies for student records. These factors contributed to all teachers using the computer as a report writing tool.

Table 27 shows the areas in which the same teachers were using the computer as a personal tool.

Table 27: Teachers' Use of the Computer as a Personal Tool

Computer Application:	Percentage of Teachers Using this Application.
Report Writing	100%
Personal Documentation	29%
Activity Sheets	29%
Student Worksheets	29%
Parent Letters	29%
Class Lists	23%
Programmes	23%
Budgeting	17%
Annual Handbooks	11%
Flyers and Handouts	11%
Excursion/Camp Letters	6%
Graphics	6%

It can be seen that while the school administration supported and encouraged the staff to implement a computer

application, the teaching staff made greater use of this application.

There were common characteristics of teachers making extensive use of the computer as a personal tool. 50 % of these teachers had access to a personal computer out of school. The other 50 % took the school computer home to use for tasks both related and unrelated to their teaching. All teachers in this phase recognised the benefits of various computer applications i.e. word processing, budgeting and personal documentation.

The results showed that outside access to a computer, whether it be a personal computer or a school computer, correlated to the amount of computer use at school. If teachers were confident in using the computer for tasks unrelated to their teaching, their confidence would appear to increase in implementing classroom computing practices.

The results show that the overall use of the computer to support classroom practices was low. Apart from the use of the reporting package, the computer was not used frequently to support teacher learning objectives.

It seems that computer usage may not change unless specific factors are addressed by the Ministry of Education or school staff. Continued school support in the area of teacher

training, resources, encouragement from the school administration and Ministry personnel and computer support materials will be necessary to ensure teachers continue to progress through the phases of implementation.

Factors Influencing Attainment of Goals Outlined in the
Computer Education Policy Document.

Data gathered from teacher interview sessions, observation of classroom practices and interpretation of information collected from the teachers' documentation and log book entries, all highlighted a number of key issues which affected the school computer education programme.

A number of key factors influenced the attainment of various goals outlined in The Policy Document. Factors affecting attainment were categorized into internal and external factors. The external factors which influenced the computer education programme were beyond the teachers' control. There were a variety of external factors which may have influenced the teacher's computer programme. Time restraints affected the contact time teachers with students and the numerous curriculum contents areas placed restraints on the total time available in the classroom programme. The school swimming programme was conducted in Term One for two and a

half weeks. This reduced the teachers' total contact time with students.

Computer resources were another external influence unable to be controlled by the individual teacher. Hardware and software resources placed limitations on the type of computer education programme. The school organisation of resources may not have suited individual teacher's computer programme. The school's administration policy was an additional external factor influencing the teacher's programme. The teacher's training and knowledge in the area of computer education was an additional internal influence on the computer education programme conducted by each individual teacher. The teacher training related to the teacher's goal achievement.

Teachers' resistance to change and technology was an additional internal factor contributing to the type of computer education programme carried out in a classroom.

Tandem teaching arrangements were an internal influence on the type of computer education programme conducted by the teaching partnership.

Software Resources

The most common software applications used by the classroom teachers at this school were drill and practice and simulation packages. The factors which contributed to this usage were found to be the teachers' lack of training and knowledge about possible computer applications and the availability of a variety of computer application software.

Table 28 shows the computer software usage within the school by teachers.

Table 28. Software Applications

SOFTWARE APPLICATIONS	TOTAL PERCENTAGE USED
Drill and Practice	48.5%
Utilities	20.4%
Adventure Game	9.7%
Word Processing	8.7%
Educational Game	6.8%
Simulation	5.8%
Database	0.0%
Spreadsheet	0.0%
Logo	0.0%

This table clearly indicates that software classified as drill and practice software was used most frequently by classroom teachers. All available school software was recorded and the amount of use by each individual teacher was noted to formulate the data in Table 28.

The software resources available at this school caused the use of drill and practice and simulation packages. Most software resources were these types of computer applications. This school had only one spreadsheet, database and logo software package. This would partly account for the very limited use in these areas. Table 29 shows the software resources available at the school.

Table 29: School Software Resources

SOFTWARE APPLICATIONS	TOTAL NUMBER AT SCHOOL
Drill and Practice	23
Utilities	3
Adventure Game	4
Word Processing	4
Educational Game	5
Simulation	11
Database	1
Spreadsheet	1
Logo	1

Only three staff members were familiar with these types of applications and had received any formal training about these applications. The Policy Document encouraged extensive use of tool software which was outlined in the extended implementation phases. To reach this level, the staff would have had to make extensive use of tool applications such as spreadsheets and databases.

The software resources available at the school strongly influenced the type of computer education programme undertaken by individual classroom teachers. Teachers who did not receive training or inservicing about new software packages and applications, would find their computer use stagnating and remaining unchanged.

Most teachers made no reference to the Western Australian Ministry of Education computer education software resource file, Software Focus. Teachers were not familiar with the file and did not know what information was included in this document. The computer coordinator used this resource to help with the selection of software because it contained critical reviews of available software packages. Teaching staff played a limited role in the software selection and very rarely asked for new computer resources to be purchased. The Policy Document outlined that teachers should become confident in their selection and appraisal of software. The Policy Document also stated that teachers

should be willing to contribute their views to others via the resource document, Software Focus. All staff members at this school were not in this developmental stage and would have needed further training to reach this level.

Teaching staff interviewed at this school did not address the concerns about software quality, but rather had concerns relating the time it took to become familiar with the available software packages. Although purchasing of the software was the responsibility of the school's computer coordinator, teachers still discussed problems with finding time to review the software to see what was appropriate for their students and their programme. This factor limited their computer goal achievement. There was a variety of software resources available at the school and funds were readily available for all staff members to purchase any desired software. Through lack of knowledge and training software applications use was limited in database, spreadsheet and logo packages. This type of software available reflects the low level of usage.

Hardware Resources

The majority of the teaching staff supported the belief that they had adequate computer resources to successfully implement a computer education programme in the classroom. 50% of the teaching staff interviewed, wanted the hardware

resources centrally located so all students could have computer access at the same time. The other 50% were satisfied with the stand alone arrangement.

Teachers supporting centrally located computer resources, believed that the computer education programme would be strengthened and be far more effective if computer hardware resources were located in one room. They indicated that it would improve the current inequitable access to the computer by their students. Many teachers' computer practices displayed inconsistent accessibility to computer resources.

Children who completed other work early, were often given the opportunity to work on the computer. The majority of teaching staff interviewed (70%) allowed children to use the computer once they had completed set activities. One set of tandem teachers used computer access as part of their class reward system. The school arrangement of hardware resources had an obvious influence on the computer education programme conducted by the teachers. A number of teachers who were achieving in the initial stages of the computer policy goals were dissatisfied with the organisation of hardware resources. They did not incorporate the regular use of the computer in their own teaching environment as a tool to achieve particular objectives. So despite the availability of hardware resources in each classroom, computer use was still limited. This may indicate that hardware alone is not

sufficient to ensure full implementation of The Policy Document or it may indicate that not enough hardware was available. Teachers had mixed feelings about the organisation of hardware resources which may have also contributed to the type of computer education programme undertaken.

Teacher Training and Knowledge About Computer Education

All teaching staff had received a copy of The Policy Document. The teachers' did not make reference to the goals outlined in The Policy Document in their formal planning and written documentation. This Policy Document had not been discussed by the whole staff nor had the individual computer education goals and their implementation been addressed by the teaching staff and administrators.

The school staff's perceptions about computer technology were influenced by the amount of prior experience, as well as the inservice training they had received about computer education.

The teaching staff at this school averaged 9.8 years of teaching experience, therefore as the use of computers was a technological innovation in the education system, only 23 % of the teaching staff had received formal computer instruction in their undergraduate teacher training. All

teaching staff in this category reported that computer education skills were developed through either mathematics or elective courses. Teachers who had not received pre-service or inservice training needed training to ensure they proceeded to the extended computer implementation as outlined in The Policy Document.

All staff who had been teaching with the availability of computer resources for 0 - 1 years, were in the transitional phase of limited computer use to moderate computer use in their classroom computer practices. This result suggested that even with differing background training and knowledge about computers, teachers needed time to work in a class situation with available computer resources before higher levels of computer use could be achieved.

All teaching staff, except one temporary status teacher, had received some type of computer education inservicing or had attended some professional development course. Only one staff member had received extensive professional development in the area of computer education. This teacher completed four post graduate courses in the area of computer education as part of her Bachelor of Education. This teacher achieved moderate computer use in her classroom and made extensive use of the computer as a personal tool. The teacher who had no formal computer education training was also making extensive use of the computer as a personal tool. Therefore

training alone may not influence the type of computer practices displayed by a teacher.

Other staff training had been in the area of computer management and the word processing applications. Staff professional development was not extensive or ongoing and therefore many computer applications outlined in The Policy Document were unfamiliar to the staff. Knowledge of The Policy Document was scant and not given a high priority by the teaching staff.

Teacher Resistance to Change and Technology

Most staff members interviewed, supported computer use into their classroom programme. However, they felt that other subject areas took a higher priority as a separate subject area. The majority of the teaching staff interviewed suggested that computer education should be taught as a separate subject area or by a computer specialist teacher. This factor highlighted their feelings of inadequacy to teach this subject and their general lack of knowledge in this field.

Table 30 displays the priority ranking of the most important subject to the least important subject as perceived by each teacher. The total score was obtained by weighting subject priorities. The subject ranked one was allocated 14 points

while the lowest ranked subject was allocated one point. By adding up the scores for each subject according to teacher preferences, a total figure of priority for each subject was able to be obtained.

Table 30: Priority Ranking of Subject Areas.

SUBJECT	TOTAL SCORE
<hr/>	
Reading	235
Mathematics	210
English	201
Creative Writing	167
Spelling	166
Social Studies	141
Oral English and Drama	110
Science	107
COMPUTER EDUCATION	100
Health Education	90
Handwriting	88
Physical Education	72
Art and Craft	57
Music	42

Table 30 showed that most teachers did not view computer education as a major subject area. The majority of teachers viewed reading, mathematics, english and creative writing as higher priority subjects. This suggests that the teachers did not see computer education as a separate subject area but as a tool to be used to achieve learning objectives. The Policy Document supported computer use in all areas of the curriculum and therefore did not encourage it to be taught as a separate subject area.

The practices and perception of the teachers seemed to be in accord with the Policy Document in this regard. The computer appeared to be viewed more as a tool to support educational objectives than an instrument of study in itself.

Management Issues

An additional factor which influenced individual teacher's attainment of computer policy goals was management issues. Four tandem teaching partnerships were part of the staff under study. Common patterns occurred in the method in which these teachers organised their computer education programme. Two tandem teaching partnerships were new staff members to the school. They both displayed no computer use in term one, as they had other management priorities which took precedence over the computer education programme during this time period.

All four teachers involved, highlighted the need to establish class rules, build up rapport with students and establish class routines rather than make use of the computer. These factors had their highest priority at the time. They felt that a computer education programme would be disruptive to their classroom organisation at the early stages of the year.

The other two tandem teaching partnerships adopted a different computer education management arrangement. One teaching partner took total responsibility for the computer education programme. The teacher which had the greatest expertise and confidence in the area, organised the whole computer education programme within their own timetable. The tandem teaching organisation limited the use of the computer across the curriculum. If one teacher became responsible for the computer programme then it would be possible for it not to be used in other curriculum areas as supported by The Policy Document goals.

Administrative Support

The school administration fully supported computer use as part of the school education programme. It was established as a priority area for the 1988 School Development Plan. Staff professional development in this area was given on a school professional development day in 1989. All staff

members were inserviced about the implementation and integration of various software packages into the classroom programme. The school Regulation 188 teacher had been assigned the role of school computer coordinator for the past four years.

All teaching staff felt that there was a strong school support group and other teaching staff were available who could give assistance in the implementation of their computer education programme. Results clearly showed that if administrative school support was given to teachers using the computer as an administrative tool, teacher goal achievement in this area was much higher. This was clearly demonstrated with the school report writing. All staff used the computer for this activity as it was highly recommended and supported by the school administration.

The school administration showed its support for this computer application by purchasing suitable software resources and providing additional support staff to aid all teachers using the package. This encouraged use of the computer by all staff members for report writing.

Time Restraints

Demands on the teachers' time affected staff members achievement of computer goals. Restraints on the teachers'

time limited the opportunity to review software resources. The majority of the teaching staff highlighted this external factor of reduced contact time with students. They reported an increase in specialist teachers through the increase in Lesson Enrichment Time made available by the Ministry of Education's latest regulations. Classroom teachers had less contact time with their students. They found demands on their time reduced the opportunity to review software resources.

Additional content areas and changing curriculum content affected the teaching time available. Teachers had to include more subject areas into their teaching programme i.e. environmental education.

An additional factor highlighted by several teaching staff, was the increasing number of school incursions and excursions. This reduced the teachers' total class teaching time and limited the computer education programme. As computer education was seen as a lower priority by the teaching staff, reductions in class time affected the computer education programme as teaching staff reduced the computer education programme in preference to other subject areas.

Environmental Constraints on the Computer Education Programme

All teachers made mention of the difficulties in implementing the computer education programme because of physical classroom constraints.

The positioning of the classroom power points determined where the computer was placed in the classroom and it was often not the best possible alternative. Lack of classroom space meant that the computer was a distraction to other classroom activities and the teachers felt uncomfortable about this positioning. Computer group work was limited due to the constraints of available physical space.

As suggested, a variety of key factors influenced the teachers' adoption of the computer education policy. Most teachers made some progress from the initial phase, however classroom practices did not display extended implementation of the computer. Many internal and external factors needed to be addressed to ensure all teaching staff at this school progressed along the continua indicators outlined in The Policy Document.

There were a significant number of impeding factors which limited extended implementation of The Policy Document, many of which would continue to limit full attainment of all The

Policy Document Goals. It was not likely that all teachers in this school would achieve all computer goals unless the outlined factors were acknowledged and addressed.

CHAPTER 6

Limitations of the Study

This chapter highlights factors which may have influenced the results of the study.

- a) The results of this study have limited external validity for other populations, as a result of a selection of a specific sample.
- b) Honesty of the participants can never be completely ensured. Measures were taken to encourage teachers to complete log books and interviews to their highest integrity. Anonymity was assured to encourage accuracy and honesty.
- c) Internal and external factors may contribute to changes in the school environments, therefore the results may not reflect the situation in a different point in time. Ministerial policies, changes in staff and resources etc, are all possible examples of internal and external factors which can cause change. If the researcher is aware of possible changes, these factors can be recorded in the data of the study.
- d) Direct interview contact may result in biased responses being given by the interviewee. The answers could be

affected by his or her reaction to the interviewer, either positive or negative.

- e) The sheer presence of the researcher may influence the setting, and the activities or views expressed within it. However, if the researcher is aware of the affect his or her presence is having on participant's behaviour, this can be acknowledged in the data of the study.
- f) The data collected was unable to verify why the teachers preferred to use drill and practice software. The extensive use of drill and practice software could have been attributed to one or more of the following factors:
 - i) availability of large quantities of drill and practice software at the school;
 - ii) ease of use;
 - iii) suitability to teachers' general educational practices.

Ethical Considerations

Anonymity and confidentiality were assured to all respondents. The teachers had the right to refuse to participate in the study. On completion, the case study report has been made available to the school involved and its staff members.

CHAPTER 7

Conclusions and Recommendations

This study has aimed to investigate the goal achievements of a teaching staff at a Western Australian Primary School.

The purpose of this study was to:

1. Investigate the use of computers across a school population, and to explore prevalent patterns. Specifically it intended to examine the degree to which goals, as outlined in The Policy Document, have been met by primary school teachers in a school setting.
2. Examine what factors influence the attainment of the goals outlined in the 'Computer Use in Primary Education Policy'.

Data was gathered to establish individual teacher profiles and a whole school profile on goal achievement related to The Policy Document. Data was collected through teacher interviews and questionnaires, analysis of written documentation and log book entries. Interpretations have been made relating to the degree to which teachers have been implementing the policy goals. The teachers have been classified into phases of achievement. Patterns and trends

that exist between teachers and which influence their computer education programme have been identified.

All the data was collected from one school in the northern district, thus generalizations were specific to the overall achievement of policy goals to this school in Western Australia.

Although the study specifically addressed computer implementation and policy goal achievement in one school, many of the findings may be applicable more widely to computer education programmes in other schools, especially those which have similar resources and the same types of school support structures.

A set of recommendations have been presented to help the school staff and administration make further progress in successfully implementing The Policy Document. These recommendations will contribute to the teachers' progress from early computer education implementation phases to extensive use of the computer phases.

Recommendations

To ensure teachers progress through the phases of implementation outlined in The Policy Document, the impeding factors discussed need to be removed. The findings of this

study indicate that a number of inservice sessions for all staff members should take place. This is to ensure that teachers will progress along the continua and make extensive use of computers as an effective tool for learning.

The school staff needs to become familiar with the goals outlined in The Policy Document and as a staff, set goal achievement as a priority in the School Development Plan. If computer education is recognised as a priority, then resources and funding can be allocated to this area.

In 1991 all schools will be required to partake in school based decision making and a school development plan will need to be established. Teachers will be given the opportunity to contribute to school decisions about learning priorities. The priorities established by staff, parent and citizen representatives and the principal will form the focus of the school development plan. Teachers, parents and the principal will need to perceive as a priority the successful implementation of computer education into the programme. Thus resources can be allocated to support the programme.

The study's findings suggested that teachers were unfamiliar with The Policy Document and even though the school had established computer education as a priority in 1988, the present teaching staff were not advancing along The Policy

Document continua. Therefore this shows that the whole staff needs to be committed to the progression of computer policy goal achievement.

Teaching staff who had been involved in the formulation of the computer education implementation programme in 1988, were achieving in higher phases than the new staff members. The new teaching staff who were not involved in the decision making process recommending this computer programme, were less committed to the computer education programme. Consequently these staff members were achieving in the lower phases of goal achievement. Thus a commitment by the whole staff in this area may encourage progression through phases.

It is recommended that the administration staff of the school encourage formal planning and documentation of the teachers proposed computer education programme. This will support one of the computer goals outlined in The Policy Document.

An overwhelming number of teaching staff are using the computer as a personal tool for report writing. This is clearly linked to the support and encouragement given in this area from the school administration.

Staff inservicing needs to include a number of key areas which will help teachers progress along the developmental

continua of indicators outlined in The Policy Document. Teachers need basic familiarisation with various software application packages to ensure they are aware of all possible computer uses. Many computer applications recommended on The Policy Document were not being used due to insufficient knowledge about the software packages available to support this use.

The teaching staff must become actively involved in software selection. They need to be inserviced on methods to accurately evaluate software packages so an accurate judgement can be made about the software applicability. Teachers will then be able to make valuable judgements about the educational worth of a particular software package. Teachers need induction on various methods for integrating the computer into different curriculum areas so that the computer is used as a tool to support existing curricula rather than as an extra subject area. The Policy Document clearly supports the use of the computer as a tool to support existing curricula.

Conclusions

This study has examined computer implementation in one school. By employing a multi-method approach, this study has identified that most teachers have been achieving in the initiation to moderate phases of implementation. Teaching

staff have not displayed extended implementation of policy goals in all recommended areas. A number of key factors have influenced the teachers' attainments of these goals.

These factors include: the school support structures established to assist the computer education programme, environmental constraints, background knowledge and training in all areas of computer education, the availability of resources, and on going training to supplement the teachers' knowledge in the area of computer education.

A set of recommendations have been presented to help the teaching staff in the attainment of computer goals outlined in The Policy Document. The extent to which those recommendations are acted upon could determine the degree of further progress in achieving full implementation of The Policy Document. There is a definite need for teacher training and professional development to ensure progress is made in implementing The Policy Document to reach the desired ministerial aim of full implementation. In the long term, professional development may influence the quality of computer education conducted in this primary school.

DEFINITIONS**Computer Assisted****Instruction (CAI)**

A method of teaching in which the computer is intended to replace the teacher or textbook for tutorial or drill and practice purposes for extended periods of time. The writer of the instructional materials effectively dictates the method, sequence and content of the learning process, leaving little real choice to the learner or the teacher (Sully, 1982 p.7).

Computer Assisted**Learning**

A method of teaching and learning with the help of computers. This method enables students to use the computer as a learning aid. It often uses simulation and trial-and- error techniques. CAL can be described as a teacher-directed and learner-controlled use of the machine (Sully, 1982 p.7).

Computer Assisted**Teaching**

The computer is used to assist the teacher in instruction.

Computer Based**Learning**

This encompasses all types of learning and interaction with the computer.

Computer Based**Training**

This uses the computer as a medium for training courses.

Computer Managed**Learning**

Involves the computer providing the course and according to the students progress, directing them to appropriate sections in the programme.

Databases:

Databases are a means of storing and retrieving large amounts of information. School applications involve students using the computer to access large amounts of stored information.

Demonstration:

The teacher illustrates a concept to the class using the computer as the medium.

Drill and Practice: The student revises knowledge and skills using a computer programme.

Programming: Students develop a set of instructions for the computer to help solve a problem.

Simulation: Student uses a computer to imitate a real or imaginary situation.

Spreadsheets: Information storage packages which perform calculations on the stored data.

Tutorial: Student is presented with new information using some computer software.

Word Processing: A computer application which enables the user to create, store and modify text.

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Log Book

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APPENDIX B

Teacher Attitudes Questionnaire

1. How would you describe your classroom use of computers?
 - a. A non user.
 - b. An occasional user.
 - c. A moderate user.
 - d. An extensive user.
 - e. None of the above.
2. Why do you use computers in your teaching ?
 - personal reasons.
 - student related reasons.
 - satisfy school requirements.
3. Do you use computers outside class ?
 - for school related work. (e.g Preparing class activities / for record keeping ?)
4. Do you use computers for tasks unrelated to your teaching ? (e.g Word processing ?)
5. How has your use of computers changed over time ?
6. Has your attitude towards computers changed as you have gained reater experience ?
7. What knowledge do you have about the computer in the classroom ?
8. Could you tell me why you use computers in your class, or why do you not use them extensively ?
 - i. Is time a factor ?
(In class are there other demands on your time, are there too many other things to do or perhaps other material to cover ?)
9. Do computers fit into how you want to teach ? (Philosophical or pedagogical reasons.)
10. How does the computer affect your classroom teaching ?

11. What role do you think the computer plays in the curriculum?
12. Do you think the computer is an effective tool as other technologies such as radio, television, videos or films?
13. Could you explain how the computer affects the classroom ?
14. What other teaching tools, materials or aids do you prefer to use ?
15. Do you think the software available at this school is adequate ?
16. Do you have adequate facilities for computer use ?
17. What support has the school administration provided in your computer use ?
18. Are there other staff members you feel can help you ?
19. What support would you like which is currently not available to you ?
20. In your opinion, is teaching easier or more difficult with a computer ?
21. Do you think computers have an impact on how well students learn ?
22. Do you think computers have an impact on student motivation?
23. Do you think computers have an impact on the relationship between you and your students ?
24. Do you think computers have an impact on student behaviour ?
25. Do you think computers have had an effect on the curriculum?

26. Have you had difficulty integrating software into your curriculum?
27. What differences has the computer made to your teaching?
28. Is funding for computers in your school too high, too low, about right or are you unsure?
29. Ideally, how do you think computers should be used?
30. Is there anything else you would like to say about computers or about the computer education programme?

Principal Attitudes Questionnaire.

1. What do you see as the role of computers in your school?
2. What affect do you think computers are having on the present curriculum ?
3. In what areas of the curriculum do you see teachers utilizing thecomputer?
4. Do you think the computer is as an effective tool as other technologies such as radio, TV / VCR, films?
5. Do you think the school has adequate facilities for computer use?
6. What is the school policy on computer use?
7. Do you think it is necessary to formally plan for computer education ?
8. How are funds allocated to computer education and resources?
9. Ideally, how do you think computers should be used?
10. Is there anything else you would like to say about computers or about the computer education programme ?

Questionnaire to be given to both the Principal and Teachers.

Computer Goals.

- A. Do you think computer use will achieve any of the following goals?
- Reduce class size.
 - Increase pupil motivation.
 - Increase teacher/pupil interaction.
 - Increase pupil mastery of materials.
 - Increase pupil retention of materials.
 - Improve pupil performance.
 - Provide teacher relief for tedious administrative chores.
 - Acceleration for advanced students.
 - Supplementation for teacher presentations.

Factors Influencing Computer Use.

- B. Do any of the following factors influence your use of the computers?

Tick the factors which are applicable.

- [] The computer is not really accessible.
- [] Other teachers monopolise software.
- [] Lack of quality software.
- [] Lack of encouragement from the administration.
- [] Lack of student interest.
- [] Insufficient knowledge/training.
- [] Not confident.
- [] Lack of funding.

Attitude to the General Use of Computers.

C. Tick the appropriate attitudes which you describe your feelings towards the general use of computers.

- ☐ Challenged.
- ☐ Interested.
- ☐ Threatened.
- ☐ Curious.
- ☐ Irrelevant.
- ☐ Unnecessary.
- ☐ Fearful.
- ☐ Excited.
- ☐ Incompetent.
- ☐ Uninterested.
- ☐ Frustrated.
- ☐ Unsure.

APPENDIX C

Teacher Characteristics.

1. Number of years teaching experience _____.
2. Number of years of teaching with the availability of computer resources _____.

Teacher Computer Background.

3. Computer courses completed _____.
4. School professional development courses related to computer education _____.
5. Access to a computer outside the school _____.
6. Type of school inservicing _____.
7. Type of school support _____.
8. Type of district support _____.
9. Type of Ministerial support _____.
10. How did you get started using computers ?

Teacher Computer Knowledge.Hardware:

11. Do you know how to operate a computer - turn a BBC microcomputer on / off and operate a software package?

Software

12. Tick off the software packages available at this school that you have used. A separate chart was used to record the software packages available at the school.
13. Describe the ways the computer is used as a personal tool for you.

Teacher's Attitudes Towards the Relative Importance of
Computers in the Primary School.

1. Rank subject areas.

The subject with the highest educational priority allocate number 1, next most important 2 etc.

_____	Reading
_____	Mathematics
_____	English
_____	Creative Writing
_____	Computer Education
_____	Social Studies
_____	Art and Craft
_____	Science
_____	Handwriting
_____	Physical Education
_____	Spelling
_____	Music
_____	Health Education
_____	Oral English and Drama

APPENDIX D

Computer Use in Primary Education Policy Document

GOALS

1. For all primary school teachers to be in a position to make decisions about the potential of computers to achieve their teaching objectives and enhance the learning of the students in their care by:

- incorporating the regular use of the computer in their own teaching/learning environment as a tool to achieve particular objectives;
- using their knowledge about good teaching practice to identify potential software and to evaluate its usefulness in achieving their educational objectives; and
- using a computer as a personal tool.

OUTCOME INDICATORS

- Extent to which documentary evidence indicates computer use as an integral part of school development plans.
- Extent to which classroom practice indicates computer use as an integral part of school development plans.
- Extent to which teachers are confident in appraising software to meet their own teaching purposes.
- Extent to which teachers use a computer as a personal tool.

2. For all primary school students to:

- become confident about using the computer as a learning tool; and
- use a computer regularly across the curriculum to achieve learning objectives and to solve problems in the context of their daily classroom activities.

- Extent to which students are confident in routinely using computers as tools.
- Extent to which students regularly use computers to solve problems across the curriculum.

- No documentary evidence of planning for computer use.
- Documentary evidence that computers are used in some areas of the curriculum.
- Documentary evidence that computers are used to address areas of difficulty:
 - remediation
 - physical disability
 - gender-appropriate software
 - culture-appropriate software
 - extension
 - special needs
 - special interests
- Documentary evidence that computers are considered valuable for addressing equity issues.
- Computer use is a focus for school development planning.
- A wide variety of documentation is evident from the whole school indicating extensive use of computers across the curriculum and clearly linked to educational objectives, e.g.:
 - school development plans
 - teachers' programmes
 - hardware rosters
 - software registers
 - budget allocations
 - professional development programmes
 - student workbooks
 - software support materials

- Computers are used singly or aggregated according to geographical convenience / security rather than to maximise learning.
- Use of computers is not related to educational objectives.
- No classroom use of computers.
- Computers used for drill and practice only.
- One area of special need is addressed.
- Location and organisation of computers vary according to particular applications and teaching objectives.
- Computer use is clearly related to educational objectives.
- Computers used only for CAL.
- CAL package becomes the catalyst for learning.
- Use of extended range of CAL packages.
- Teacher prepare templates using applications software.
- Students use software to do something for which they would normally receive adult help.
- Limited use of tool software (e.g. word processing for story writing).
- Use of word processing across the curriculum Years 1-7.
- Software is used as a catalyst for extended, in-depth learning.
- Computer use is differentiated to meet the special needs and interests of individual students, e.g.:
 - gender
 - cultural background
 - ability and disability etc.
- Location and organisation of computers are varied to maximise computer resources as equitably as possible across the whole primary school.
- Computers are used selectively as most educationally - viable for the chosen learning - outcome.
- Creative use of CAL software.
- Computers are used in all classrooms across the curriculum in a variety of ways.
- Learning experiences are selected to ensure a variety of knowledge structures is explored, e.g.:
 - sequences and chains
 - tree structures and loops
 - grids
 - graphs
 - pictures
- Extensive use of tool software, e.g.:
 - Logo
 - databases
 - spreadsheets
 - wordprocessors
 - graphics
 - music
 - communications
- Application software frameworks are used by teachers to prepare learning experiences for their students (e.g. adventure generators).

- Teachers lack confidence in applying existing knowledge to decisions about software selection and use.
- Teachers recognise drill and practice software and its limitations.
- Teachers make limited use of CAL packages to achieve educational objectives.
- Teachers are able to explain what constitutes good software and how it can be used across the curriculum to achieve their educational objectives.
- Teachers confidently make use of sources of evaluation and review in selecting software to support their educational objectives.
- Teachers are able to trial new software and propose educational uses.
- Teachers are confident in their selection and appraisal of software - willing to contribute their views to others via Software Focus.
- Evidence that software has been chosen to achieve specific educational objectives.
- Teachers are able to use software creatively to meet educational objectives beyond its intended use.
- Teachers use computers for numerous daily tasks, e.g.:
 - parent letters
 - class lists
 - fixture lists
 - report writing
 - programmes
 - budgeting
 - student work sheets
 - memos to principal
 - excursion and camp letters
 - annual handbooks
 - communicating electronically with other teachers/District Office
 - flyers and handouts
 - graphics
 - silk-screen stencils
 - labels
 - mail merge
 - stock lists
 - student records
- Teachers are reluctant and tentative about using a computer.
- Teachers do not see the relevance of a computer in their work.
- Teachers are aware of possible uses of a computer.
- Teacher uses a computer occasionally for specific purposes, e.g. letters to parents, activity sheets.
- Teacher makes limited use of one application, e.g. word processing.
- Teachers make multiple use of integrated packages.

- Students only use computers when directed and for limited purposes, e.g. drill and practice purposes.
- Students use a computer regularly with guidance from teacher.
- Students use in group situation, interacting productively.
- Students display an ability to select an applications package which matches their problem, e.g. a desktop publishing package to solve layout problems.
- Subject-specific problem-solving software is used in maths, science, social studies, literature etc.
- Students use the computer to process information by organising, manipulating, retrieving, analysing and presenting data.
- Opportunities are given to develop appropriate skills and attitudes through problem-solving tasks using:
 - simple syntax in Logo etc.
 - structured interrogation of data bases
 - conditional statements and routines in software frameworks etc.
- Students confidently use content-free software eg music, word processing, databases.
- Students take the initiative to use a computer appropriately.
- Students are able to match a particular software application to their specific need.
- Students make exploratory and divergent use of a computer.
- Computers used for problem solving across the curriculum, e.g. integrated use of applications:
 - word processing
 - graphic design
 - desktop publishing
 - Logo
 - design
 - information processing, retrieval, analysis and presentation
- Computer used regularly for problem-solving activities in a particular area of the curriculum.
- Teachers are beginning to develop awareness of the problem solving potential of some computer applications.